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plans of ROUTES

RIGHTS OF WAY

TERMINALS

STATIONS

YARDS and

RELATED FACILITIES

and IMPROVEMENTS

February 9, 1961

SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

S.F.



BEFORE THE BOARD OF DIRECTORS OF THE
SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

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1961

In the matter of referring plans
of routes, etc. to District staff
and outside consultants. /

Resolution No. 161

ENVI

WHEREAS, Public Utilities Code section 29036 provides:

"The board of directors shall refer for recommendation the plans of routes, rights of way, terminals, stations, yards and related facilities and improvements to the city councils and boards of supervisors within whose jurisdiction said facilities and improvements lie and to such other state, regional and local agencies and commissions as may be deemed appropriate by the board of directors. The board of directors shall give due consideration to all recommendations submitted."; and

WHEREAS, Pursuant to resolution No. 150 entitled "In the matter of referring plans for recommendation pursuant to Public Utilities Code section 29036" adopted August 25, 1960, certain proposed plans referred to in the aforesaid section 29036 were distributed to state, regional and local agencies and commissions set forth in the attached Exhibit A (incorporated herein as though set forth at length), in addition to city councils and boards of supervisors within the district; and

WHEREAS, the board of directors of the San Francisco Bay Area Rapid Transit District has received and given due consideration to recommendations from the aforesaid agencies, commissions, councils and boards of supervisors, and made certain changes in the aforesaid plans as the result of certain of such recommendations; and incorporated such changes in the attached Exhibit B entitled "San Francisco Bay Area Rapid Transit District plans of routes, rights of way, terminals, stations, yards and related facilities and improvements February 9, 1961"; and

WHEREAS, the board of directors of the San Francisco Bay Area Rapid Transit District does desire that the aforesaid plans set forth in the attached Exhibit B be referred to its staff and outside consultants to be used as a basis for the preparation of the reports described in Public Utilities Code section 29152 preparatory to the submission of a proposal to incur bonded indebtedness.

NOW, THEREFORE, BE IT RESOLVED that the plans set forth in the attached Exhibit B are hereby referred to the District staff and outside consultants to be used as a basis for preparation of the reports described in Public Utilities Code section 29152; and

BE IT FURTHER RESOLVED that the secretary be, and he is hereby directed to mail copies of this resolution and its Exhibit B to each city council and board of supervisors within the district and to each other state, regional and local agency and commission listed in Exhibit A.

###

Adopted by the Board of Directors
February 9, 1961

Attest:

s/ A. M. Cohan
Secretary

SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Plans of Routes, Rights-of-Way,
Terminals, Stations, Yards, and
Related Facilities and Improvements

February 9, 1961

ROUTES

OVERALL SYSTEM -- The key link in the proposed system is the trans-bay underwater rapid transit tube, which ties together the routes on the eastern and western sides of San Francisco Bay by connecting the subway complexes in downtown San Francisco and downtown Oakland.

From San Francisco, the Marin Line extends north across the Golden Gate Bridge to an initial terminus at Santa Venetia, with right-of-way provided to Novato. The Peninsula Line extends south from San Francisco to a terminus at Palo Alto.

From Oakland, the Berkeley-Richmond Line extends north to a terminus at Sixth Street and MacDonald Avenue in Richmond; the Central Contra Costa Line extends east to downtown Concord; and the Southern Alameda County Line extends south to central Fremont.

Discussion of the routes in this report is based on the segments used by the engineering consultants for engineering planning and cost estimating. The segments in order of presentation, are: Trans-Bay Tube, San Francisco Downtown, Marin Line, Peninsula Line, Oakland Downtown, Berkeley-Richmond Line, Central Contra Costa Line, and Southern Alameda County Line.

TRANS-BAY TUBE -- The four-mile trans-bay tube with approaches extends eastward from the Montgomery Street Station under lower Market Street in San Francisco, passes under the south wing of the Ferry Building, and under the Bay Bridge between San Francisco and Yerba Buena Island. The line enters Oakland at the Oakland Mole and extends along Seventh Street to the West Oakland Station, between Center and Peralta Streets, where parking for 700 cars is provided.

SAN FRANCISCO DOWNTOWN -- The San Francisco Downtown segment is a complex of subways under Market Street and Post Street which provides interchange connections between the Peninsula Line, the Marin Line and the Trans-Bay Tube at the junction of Market, Montgomery and Post Streets. The downtown section of the Peninsula Line connects to the Trans-Bay Tube at the Montgomery Street Station and extends in subway in Market Street to South Van Ness Avenue where the subway swings southward and passes beneath private property to Otis Street at McCoppin and thence into Mission Street. Stations are planned in Market Street at Montgomery Street, Powell Street and Civic Center. Parking provisions are not made for delivery stations such as those in San Francisco. A four-

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track, two-level subway is planned in Market Street from the vicinity of the Montgomery Street Station to the vicinity of Van Ness Avenue. In this segment, the lower level is the regional rapid transit route connecting the Peninsula Line to the Trans-Bay Tube. The upper level initially provides an underground right-of-way in the congested downtown section for streetcars which will provide local feeder and distribution service throughout the downtown area and west of Twin Peaks. Ultimately this upper level will be used for expansion of the regional service.

The downtown section of the Marin Line begins at an underground terminal, the Kearny Street Station, at Market, Montgomery and Post Streets and extends westward in subway along Post Street to Laguna Street. Delivery stations in this section are provided at Union Square and at Van Ness Avenue.

MARIN LINE -- The Marin Line leaves the San Francisco Downtown section at Post and Laguna Streets and continues in subway along Post Street with a delivery station at Fillmore Street. The line continues in subway and tunnel in Post Street to a delivery station beneath Presidio and Masonic Avenues. Just west of the Presidio Avenue Station, the line swings northward deep in tunnel and passes beneath private property, entering the Presidio near the foot of Spruce Street. The line emerges from tunnel in the Presidio and continues on a graded section for a short distance. Then, once again, the tracks go underground in tunnel and subway beneath Arguello Boulevard, the Golden Gate Bridge Freeway, Fort Winfield Scott, and Lincoln Boulevard, to the Golden Gate Bridge.

On the Golden Gate Bridge the transit line would be placed completely within the present truss section below the roadway of the Bridge and above the lower laterals.

North of the Golden Gate Bridge, the line enters a long tunnel, surfacing in the northern section of Sausalito where the line first joins the Northwestern Pacific Railroad right-of-way. The Sausalito Station and a parking lot for 1200 cars would be constructed there. The proposed line generally follows the Northwestern Pacific Railroad right-of-way from Sausalito to Novato. From Sausalito through Mill Valley the proposed alignment follows the abandoned line of the Northwestern Pacific Railroad generally at grade. North of the Mill Valley Station, where parking for 1500 cars is provided, the line turns toward Corte Madera in a tunnel section from which it emerges to cross over U. S. Highway 101 near the Tamalpais Drive interchange. The Corte Madera Station is proposed at this location with a 1350-car parking lot. The line then runs along the

grade of the Tiburon Branch of the Northwestern Pacific Railroad, following the railroad into San Rafael where a station would be located. Parking for 1300 cars is provided at the San Rafael Station. Extending north of San Rafael the line passes through a tunnel section to Santa Venetia Station near the site of the Marin County Civic Center. Large parking lots for 1100 automobiles and a yard for rapid transit vehicles would be provided at the Santa Venetia Station near U. S. Highway 101. From this point on to Novato, right-of-way is included in the estimate.

PENINSULA LINE -- The Peninsula Line extends up Market Street from the San Francisco Downtown segment and enters Mission Street by passing beneath private property between South Van Ness Avenue and Gough Street, and by following Otis Street between McCoppin Street and Duboce Avenue. The subway line continues in Mission Street to Thirtieth Street where it swings westward in a tunnel beneath Chenery Street. In the Mission District a subway delivery station is located between Twenty-first and Twenty-second Streets. From Chenery Street the transit line approaches the alignment of the Southern Freeway by passing beneath private property, the intersection of Diamond and Bosworth Streets, and Monterey Boulevard. At the Baden Street Overcrossing of the Southern Freeway, the transit line emerges in the freeway median. A delivery station is proposed in a depressed section at Ocean Avenue, beyond which the tracks continue to occupy the median strip to the vicinity of Sickles Street. The line leaves the proposed freeway in subway, rises on aerial structure, and parallels the Southern Pacific Railroad San Bruno Branch line to Colma where it picks up the old Market Street Railway right-of-way. Through Daly City, the line remains on aerial structure and a station is provided at Knowles Avenue with parking for 1000 cars. The aerial line returns to grade for the South San Francisco Station and yard north of Chestnut Avenue. Here parking for 1400 cars is provided. The line then proceeds on aerial structure to Forest Lane in San Bruno. South of Forest Lane the line is at grade, with overpasses and underpasses for the cross flow of vehicular traffic. It is proposed to provide surface stations in San Bruno between Angus and Sylvan Avenues, in Millbrae at Center Street, and in Burlingame north of Burlingame Avenue. Parking at San Bruno is for 600 cars; at Millbrae, 600 cars; and at Burlingame, 500 cars. In Burlingame the line leaves the old Market Street Railway right-of-way and shares the Southern Pacific Railroad right-of-way to the Palo Alto terminus.

Two surface stations and parking lots would be provided in San Mateo, one adjacent to the business district between Ninth and Fifth Avenues with an 850-car parking lot, and one near Hillsdale at Twenty-fifth Avenue with parking for 650 cars. The rapid transit line is at grade on the west side of the Southern Pacific Railroad through Belmont, San Carlos and into

Redwood City. Surface stations would be located at Hull Drive in San Carlos with parking for 750 cars and between Maple and Jefferson Streets in Redwood City with parking for 850 cars. A yard would be provided for rapid transit vehicles south of Redwood City. The line continues south, west of the railroad, to the Menlo Park-Atherton Station, with parking for 500 cars, located just north of Ravenswood Avenue. The line proceeds southward to an aerial terminal station in Palo Alto just north of University Avenue, where parking for 1350 cars is provided. Aerial turnback tracks are included south of the Palo Alto Station.

OAKLAND DOWNTOWN -- The Oakland Downtown segment is a complex of subways providing full interchange connections between the Trans-Bay Tube, the Southern Alameda County Line, the Berkeley-Richmond Line and the Central Contra Costa Line. From the West Oakland Station connection to the Trans-Bay Tube, the Oakland Downtown segment extends along Fifth Street and adjacent to the Nimitz Freeway on aerial structures before entering a subway to curve under Broadway. One branch of the subway swings south under Eighth Street to an underground station near Fallon Street where the Southern Alameda County Line begins. The other branch of the subway extends in two levels beneath Broadway to Twenty-first Street and thence under private property and West Grand Avenue, to the median strip of the proposed Grove-Shafter Freeway and becomes a common facility for the Berkeley-Richmond Line and the Central Contra Costa Line. Downtown subway stations in Oakland are located at Eleventh Street and Nineteenth Street, with a continuous pedestrian mezzanine connecting the two stations.

CENTRAL CONTRA COSTA LINE -- The Central Contra Costa Line occupies the median of the proposed Grove-Shafter Freeway with a station north of MacArthur Boulevard where an 850-car parking lot is provided. Continuing eastward in the freeway, a station is provided just east of College Avenue. The College Avenue Station has parking facilities for 750 cars. At Golden Gate Avenue the line drops below the west-bound freeway lanes and enters a tunnel through the Berkeley Hills to emerge near Orinda Crossroads where the Orinda Station with its 1750-car lot is proposed. The line then parallels Route 24 freeway to Lafayette, where it crosses under the freeway to the Lafayette Station with parking capacity for 1450 cars. It then proceeds along the abandoned Sacramento-Northern Railroad right-of-way (or proposed Olympic Boulevard) and crosses under State Route 21 freeway to the Walnut Creek Station between Mt. Diablo Boulevard and State Route 21 freeway. Parking provisions for 1600 cars are included at Walnut Creek Station.

The first part of the paper is devoted to a general survey of the history of the subject. It is then divided into two main parts, the first of which is devoted to a detailed account of the various methods which have been employed for the purpose of determining the value of the constant π . The second part is devoted to a discussion of the various methods which have been employed for the purpose of determining the value of the constant e .

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From the Walnut Creek Station the line remains elevated on structure, occupying the existing Sacramento Northern Railway right-of-way until it crosses Kazebeer Road. Except for elevated structure at the Pleasant Hill Station, the line runs at surface in the existing railway right-of-way to Oak Grove Road. The Pleasant Hill Station and yard occupy the triangle formed by Geary Road, the Sacramento Northern right-of-way and the Southern Pacific right-of-way. After passing under Oak Grove Road, the line closely parallels the Sacramento Northern Railway on aerial structure from San Miguel Road to the Concord Station at Clayton Road. Parking for 1950 cars is provided at the Pleasant Hill Station and for 2000 cars at the Concord Station.

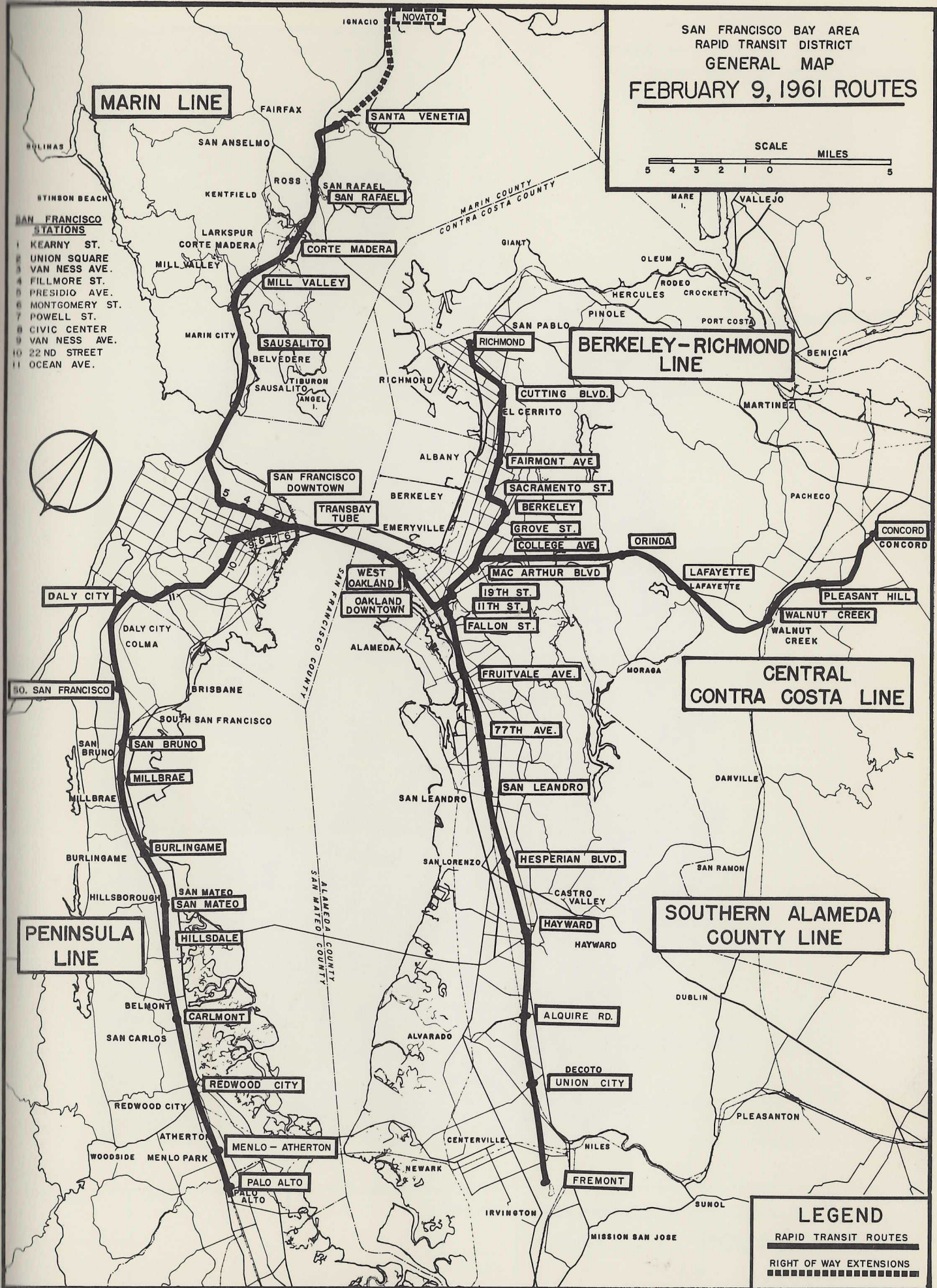
BERKELEY-RICHMOND LINE -- The Berkeley-Richmond Line also shares the median strip of the Grove-Shafter Freeway between the Oakland Downtown section and Forty-seventh Street. The line leaves the freeway on aerial structure in the center of Grove Street, which would require widening the present street and redevelopment along its west side. The line on aerial structure would be located in the center of Adeline and Shattuck Avenues until it enters a subway section under the Berkeley central business district. This would provide an aerial station just south of Ashby Avenue on Adeline Street, with parking for 900 cars, and a subway delivery station south of University Avenue in Berkeley. The Berkeley subway section extends from Dwight Way to Milvia Street, where the line rises to aerial structure on the north side of Hearst Avenue, again requiring redevelopment of the adjacent properties. The line curves to the north to parallel the Santa Fe Railroad right-of-way with stations provided at Sacramento Street in Berkeley with an 1100-car parking lot and at Fairmont Avenue in El Cerrito with a 950-car lot. The line continues to parallel the railroad right-of-way to the Cutting Boulevard Station, located just south of Cutting Boulevard, where parking for 1300 cars is provided.

Crossing over San Pablo Avenue and under U. S. Route 40 Freeway, the rapid transit line heads west through Richmond on embankment along the south side of the Santa Fe tracks. It crosses over Thirty-seventh Street, Carlson Boulevard, and the Southern Pacific Tracks on structure. At Thirteenth Street it returns to aerial structure and turns north to cross the Santa Fe tracks to a station at MacDonald Avenue between Fifth and Sixth Streets. A terminal yard is proposed along the south side of Pennsylvania Avenue between Second and Sixth Streets. A 1200-car parking lot is planned for the Richmond Station.

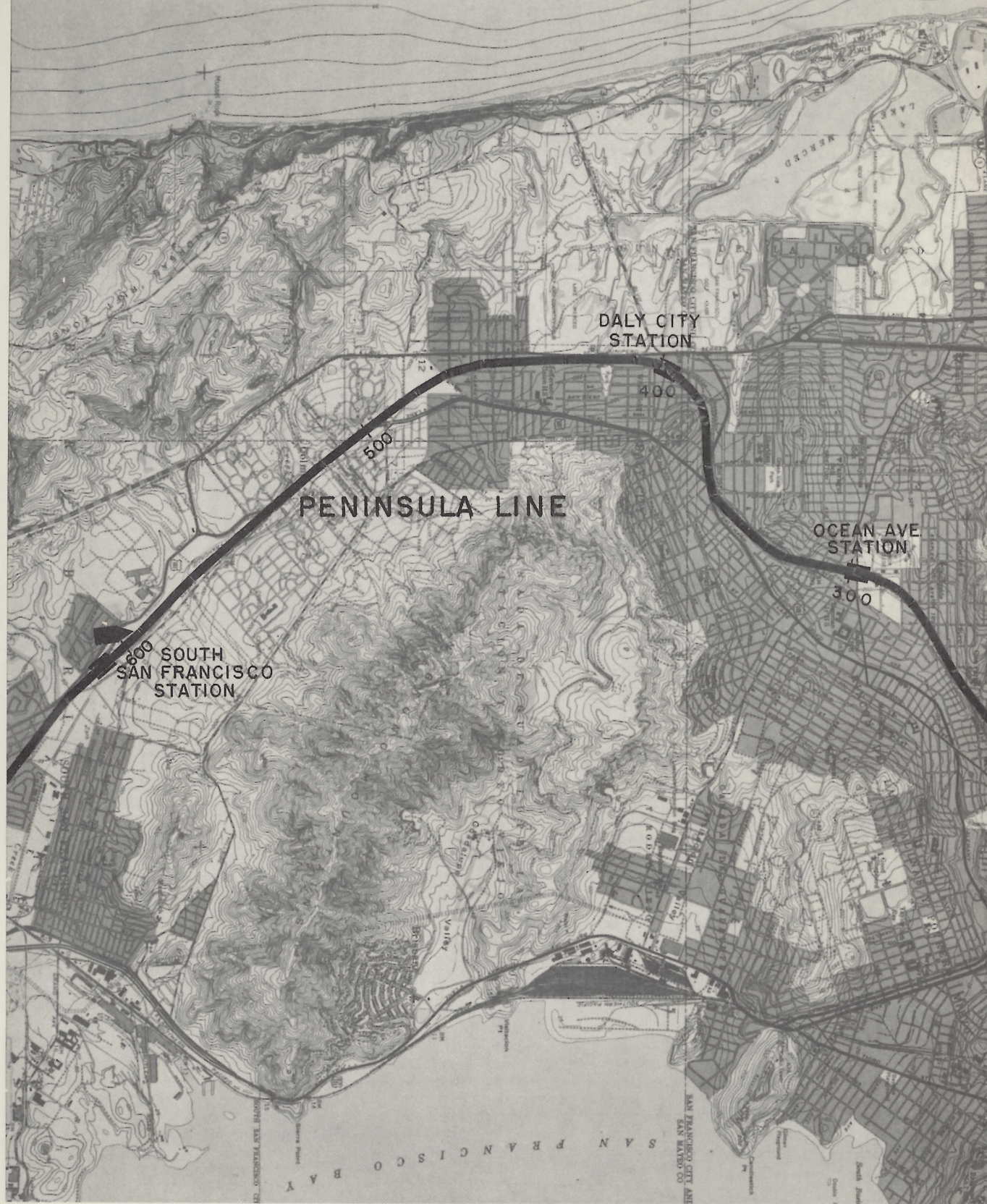
SOUTHERN ALAMEDA COUNTY LINE -- The Southern Alameda County Line connects with the Oakland Downtown section at the Fallon Street Station where parking for 400 cars is provided . South of Fallon Street Station the subway leaves Eighth Street, passes beneath the Lake Merritt Inlet, and East Seventh Street. South of Fifth Avenue the tracks rise from subway to an on-grade section along the Western Pacific Railroad. After passing beneath the Nineteenth Avenue overpass the transit line rises on structure, occupying the median strip in East Twelfth Street. At Fruitvale Avenue the line approaches an elevated station located alongside the Western Pacific Railroad between Thirty-fourth and Thirty-seventh Avenues. Parking for 1150 cars is provided at the Fruitvale Avenue Station.

From this area south through San Leandro and Hayward to Tennyson Road the line is on aerial structure parallel to the Western Pacific Railroad. Aerial stations are provided at Seventy-seventh Avenue, with parking for 1050 cars; at Davis Street in San Leandro, with parking for 1250 cars; at Hesperian Boulevard, with parking for 1750 cars; and at Jackson Street in Hayward, with parking for 1500 cars. South of Tennyson Road the line leaves aerial structure and continues south on a fill section along the Western Pacific Railroad to Dry Creek south of Whipple Road. A station is provided at Alquire Road with parking for 1000 cars. South of Dry Creek aerial structure carries the transit line over Decoto Road where the Union City Station is located, with parking for 1100 cars. A storage yard for rapid transit cars is also provided here, south of Decoto Road where the transit line drops to grade. A graded section is used to the south where the line continues to parallel the Western Pacific Railroad to the crossing of Alameda Creek. At this point the line swings southward away from the railroad to a terminal station in Fremont at Mowry Avenue near the Washington Township Hospital. The Fremont Station is in a depressed section with parking provision for 1500 cars.

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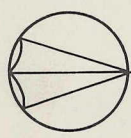
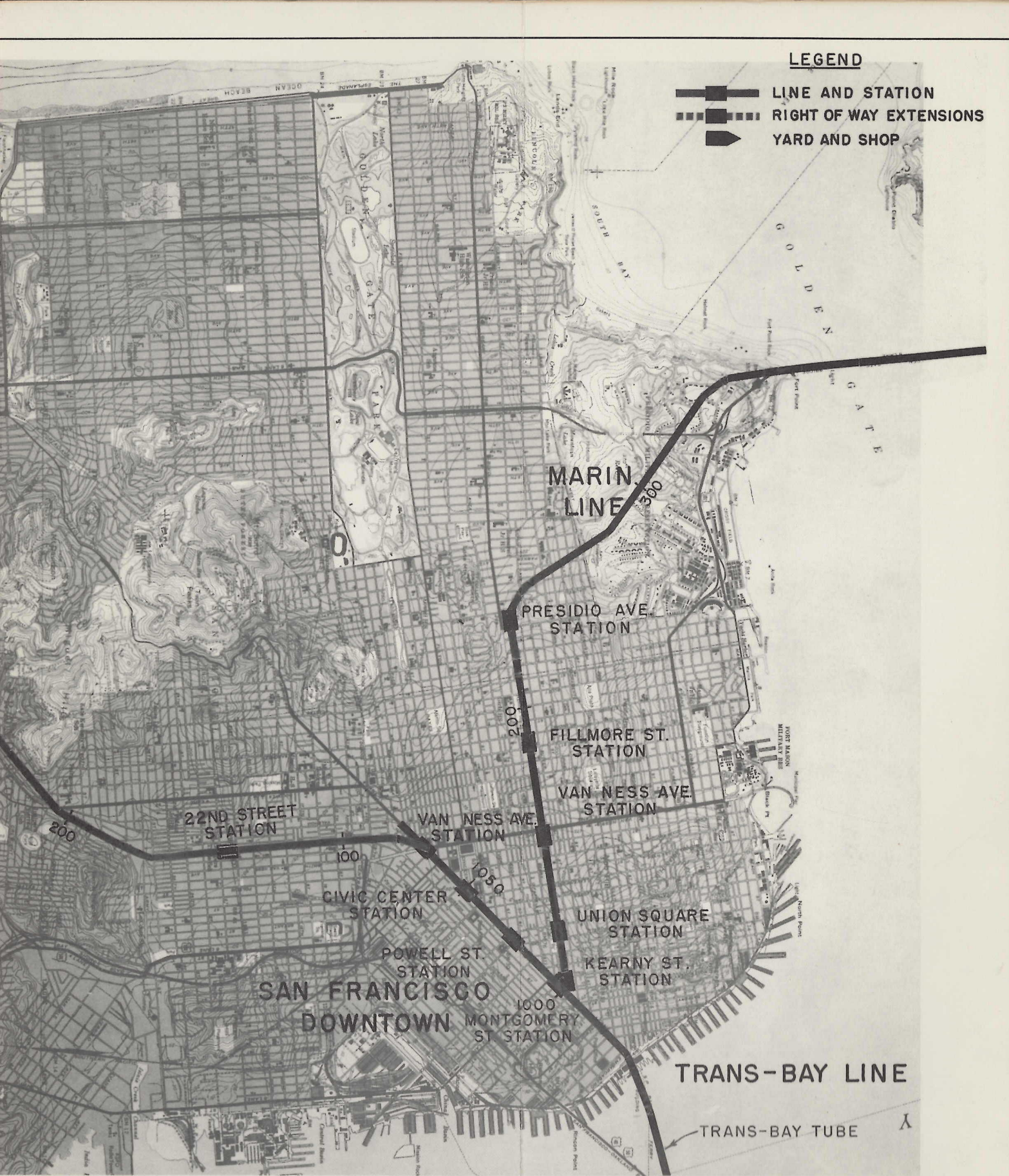
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SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT
ROUTE LOCATION & STRUCTURE PLANS

PARSONS BRINCKERHOFF — TUDOR — BECHTEL • ENGINEERS
NEW YORK SAN FRANCISCO

SAN FRANCISCO AND VICINITY
GENERAL ROUTES
PLAN

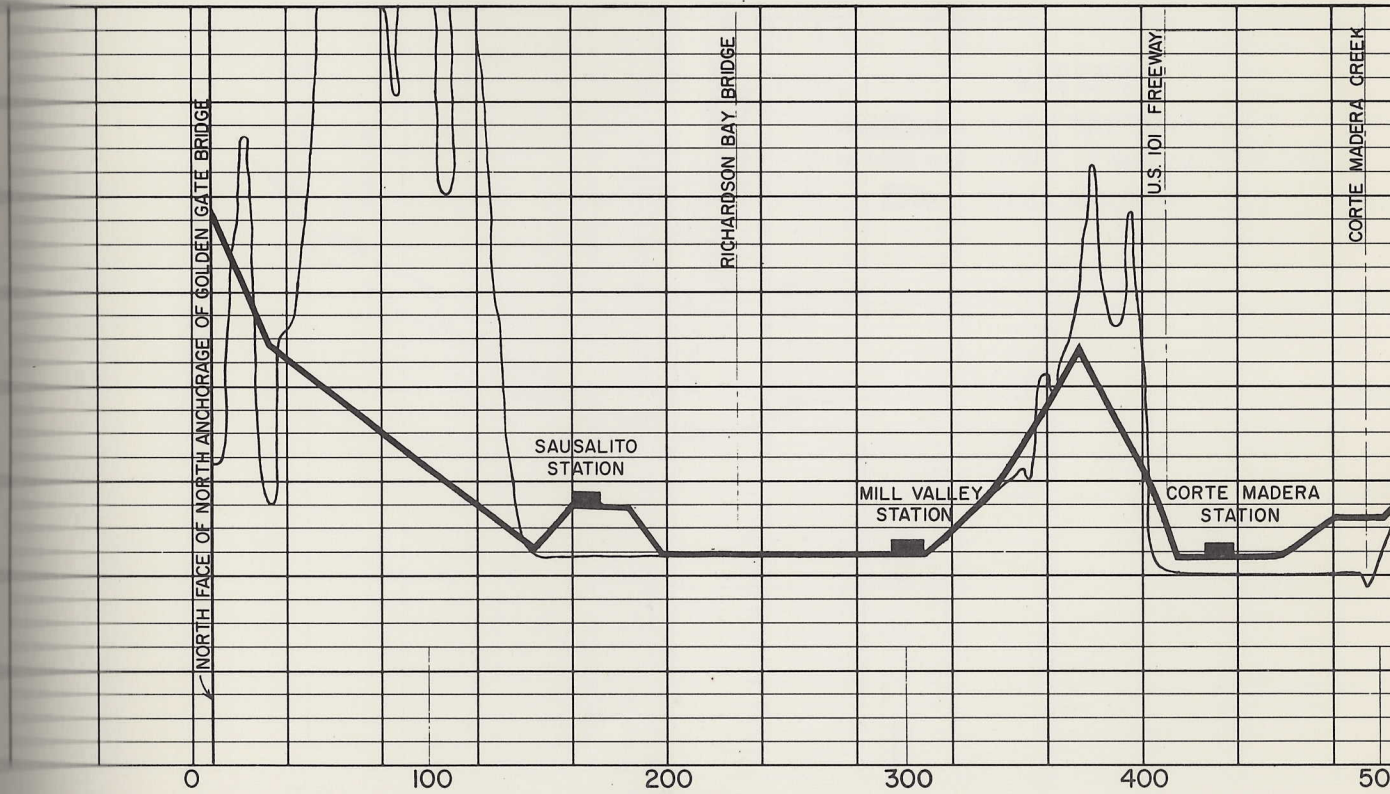
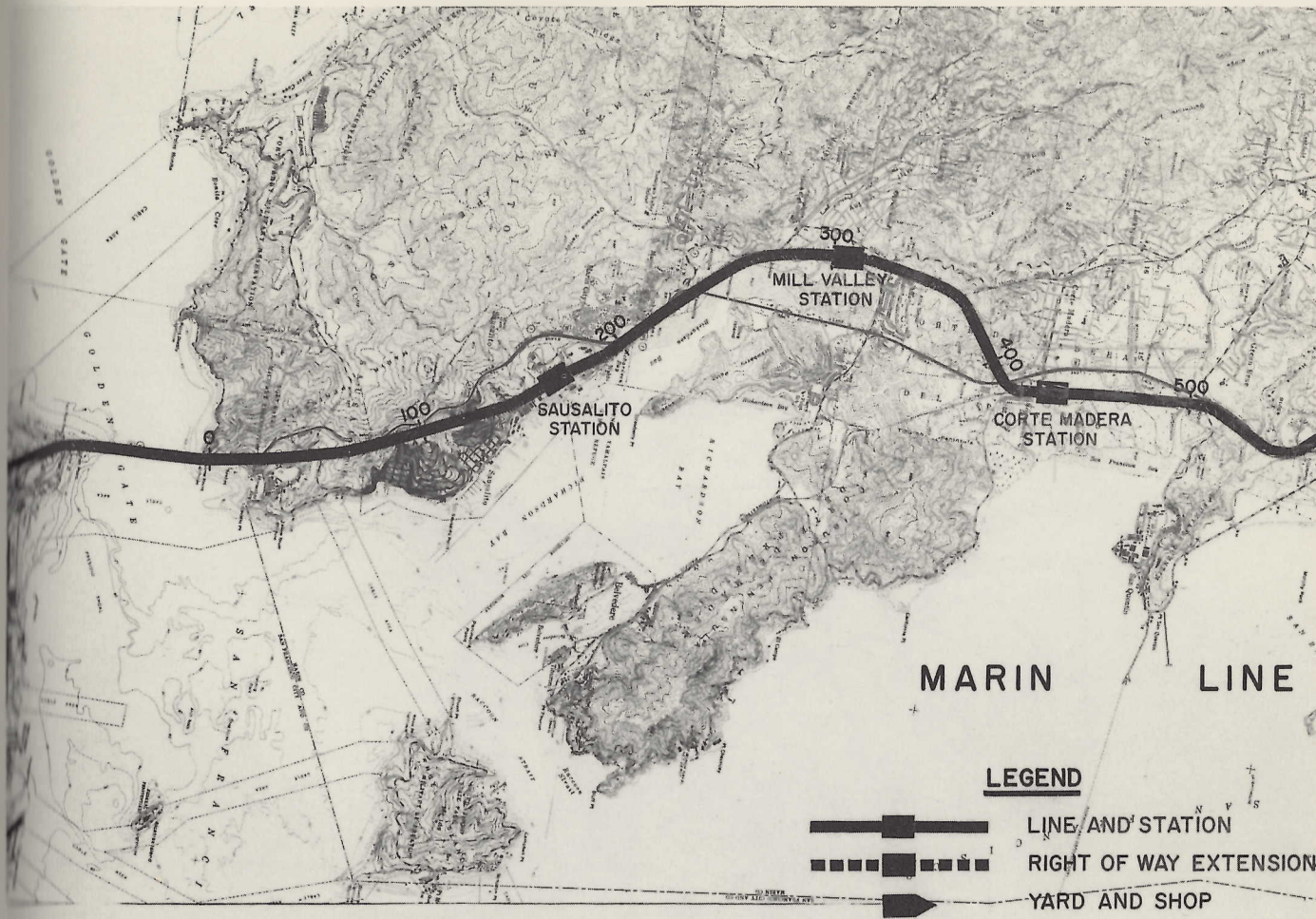
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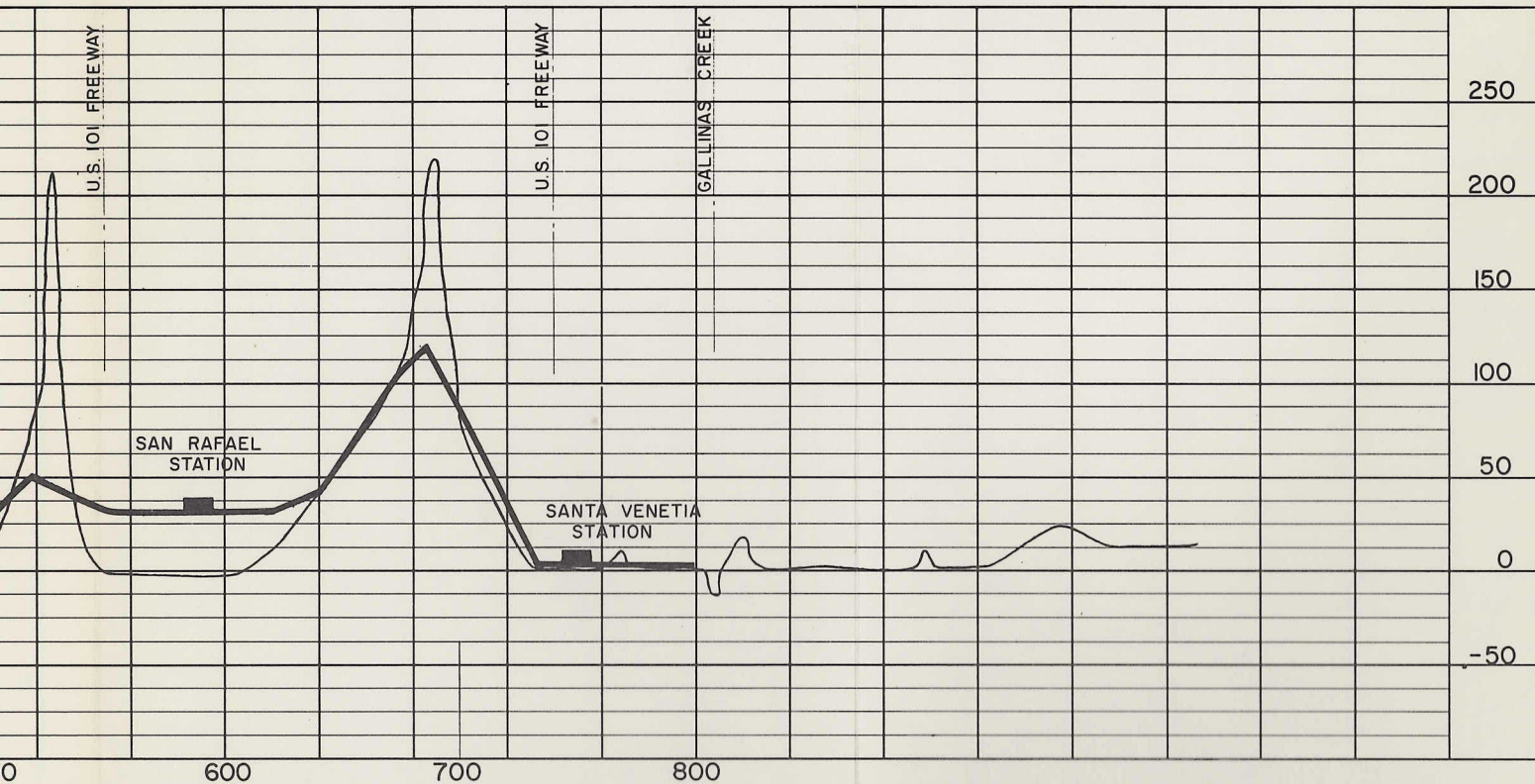
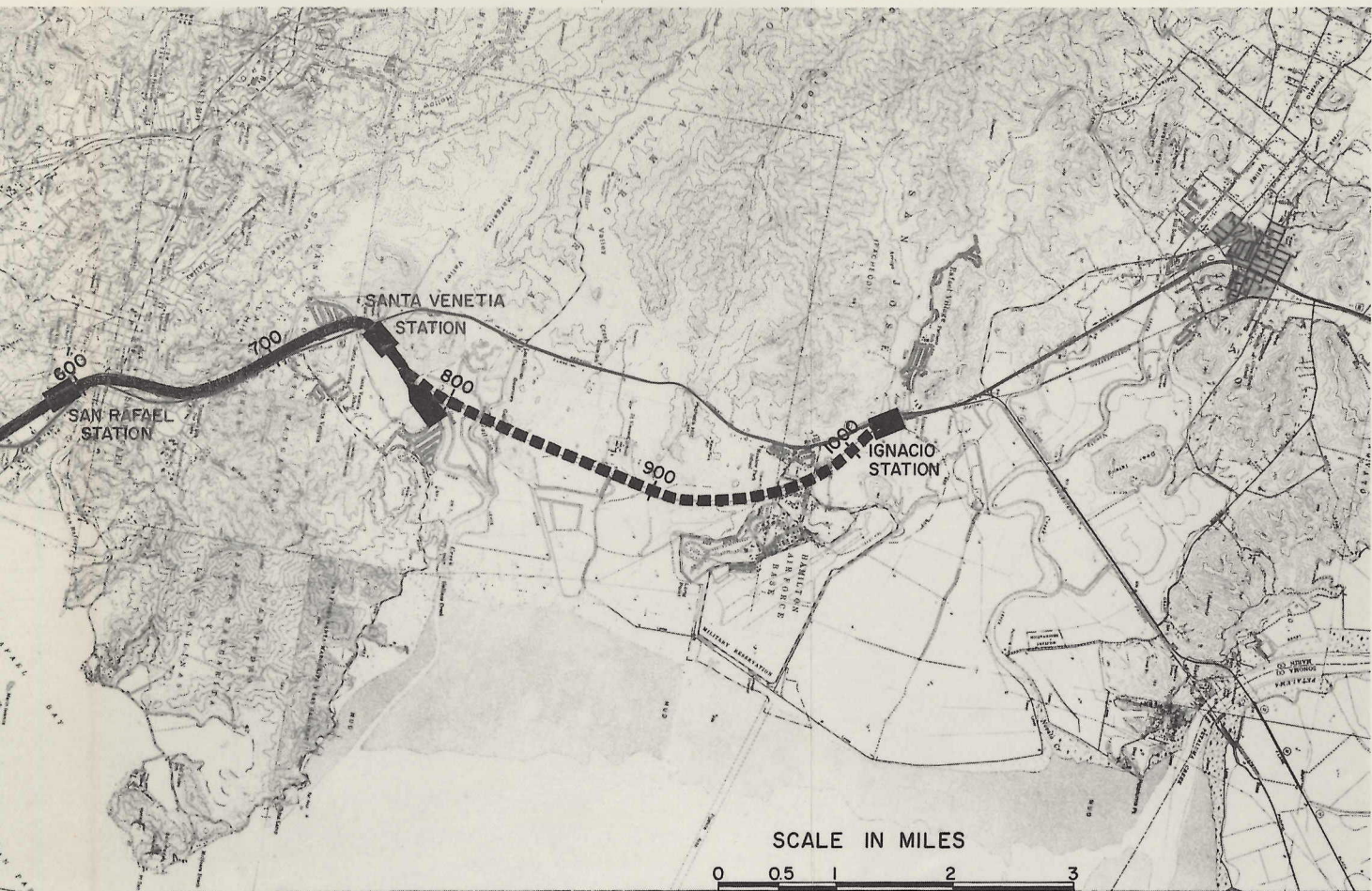
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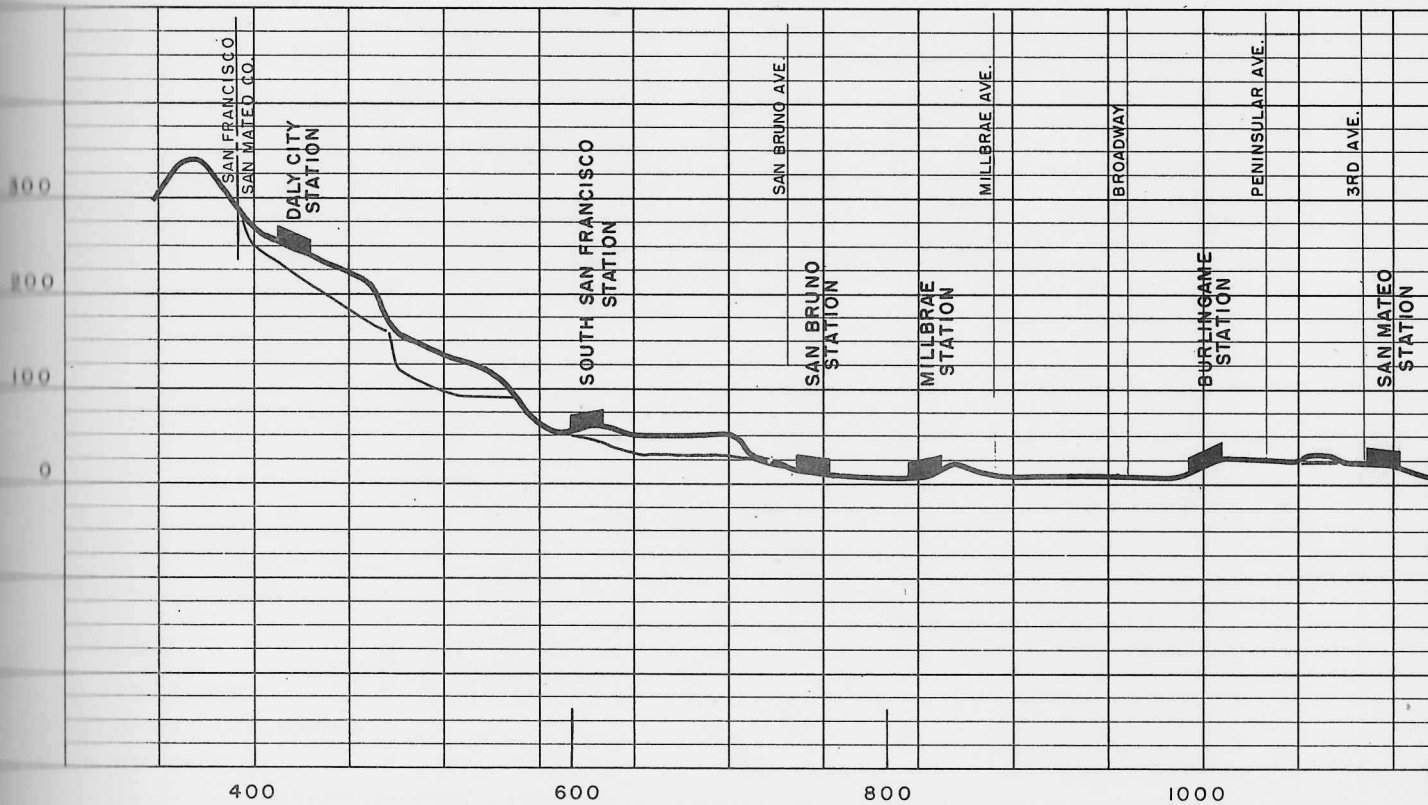
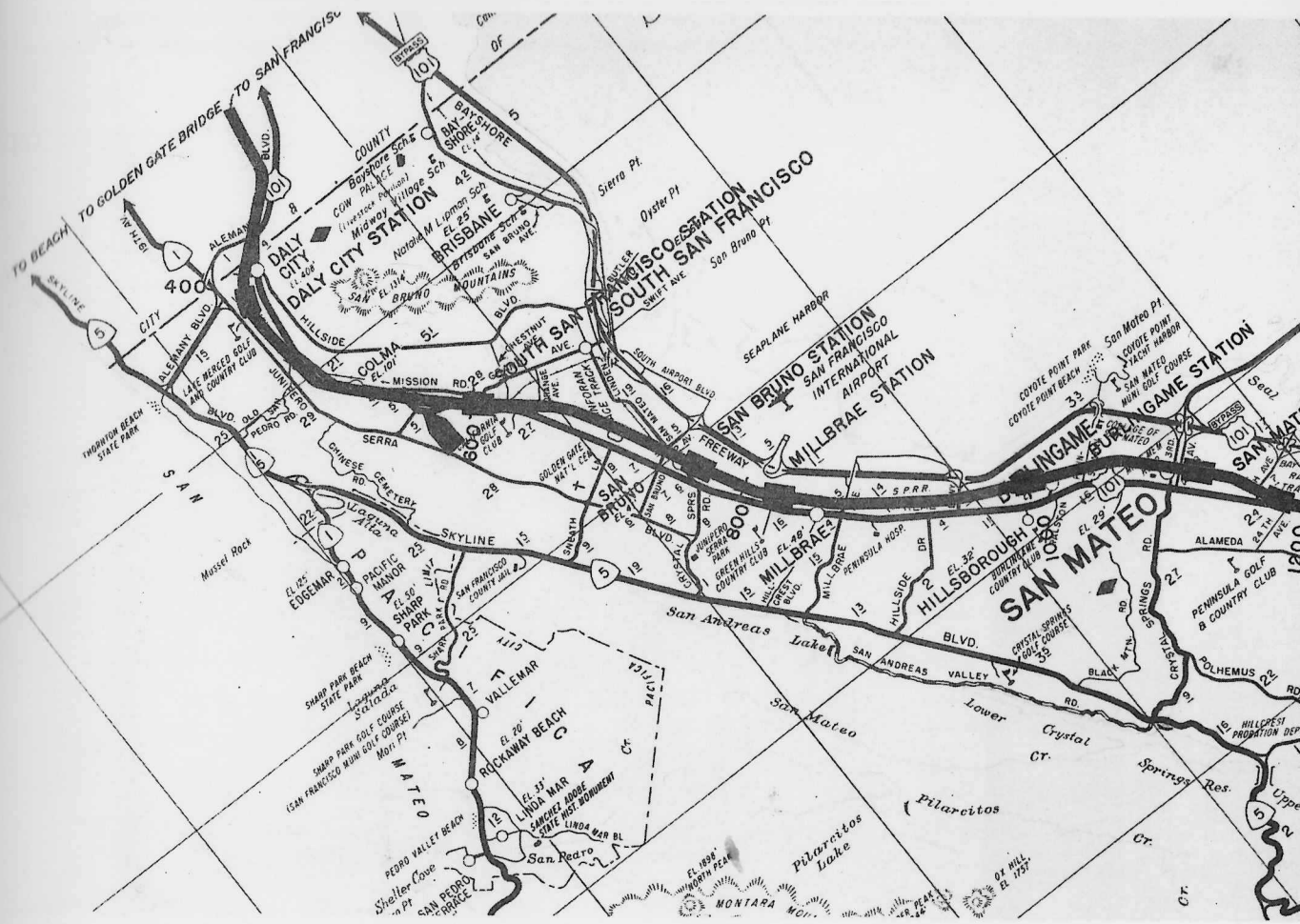
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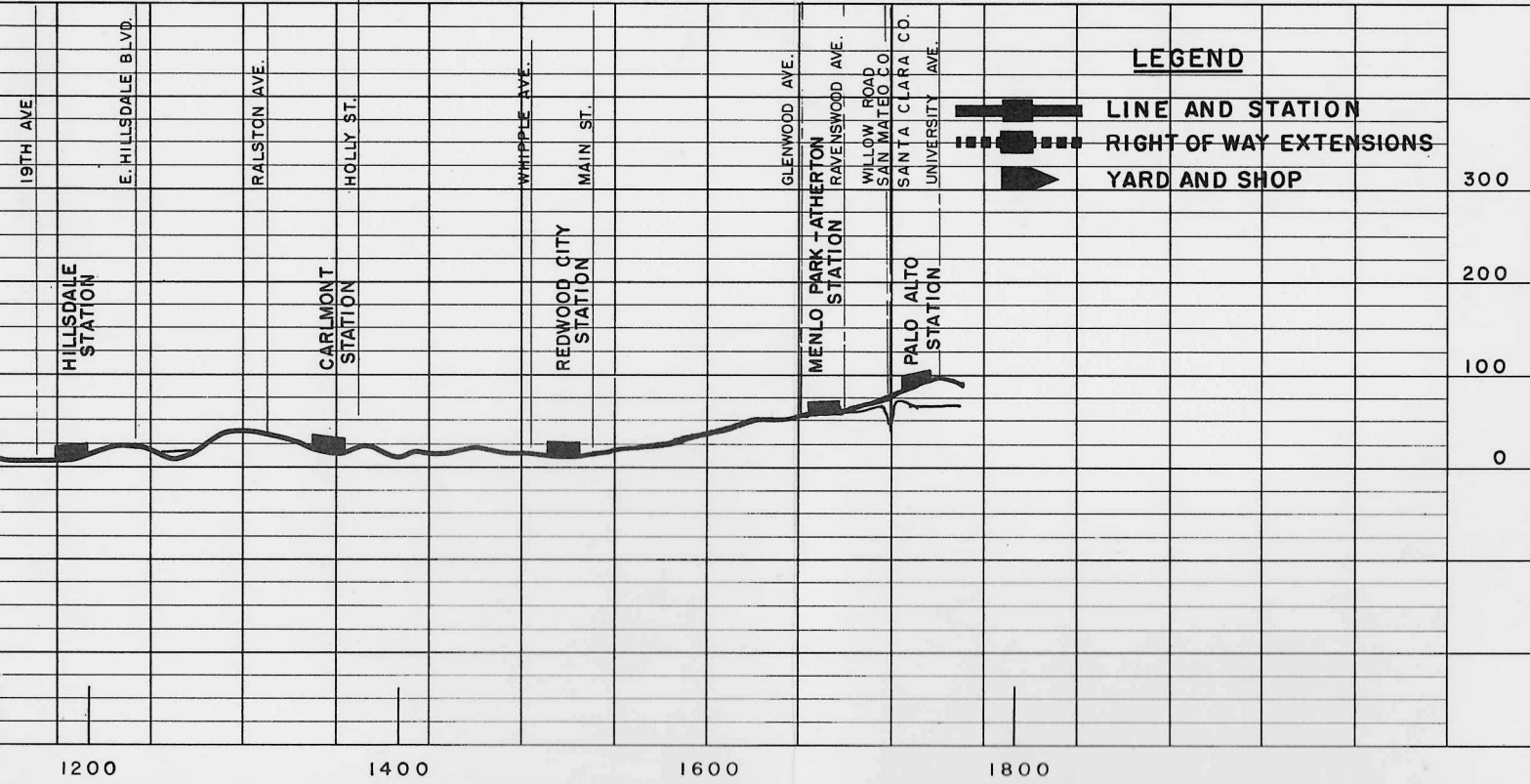
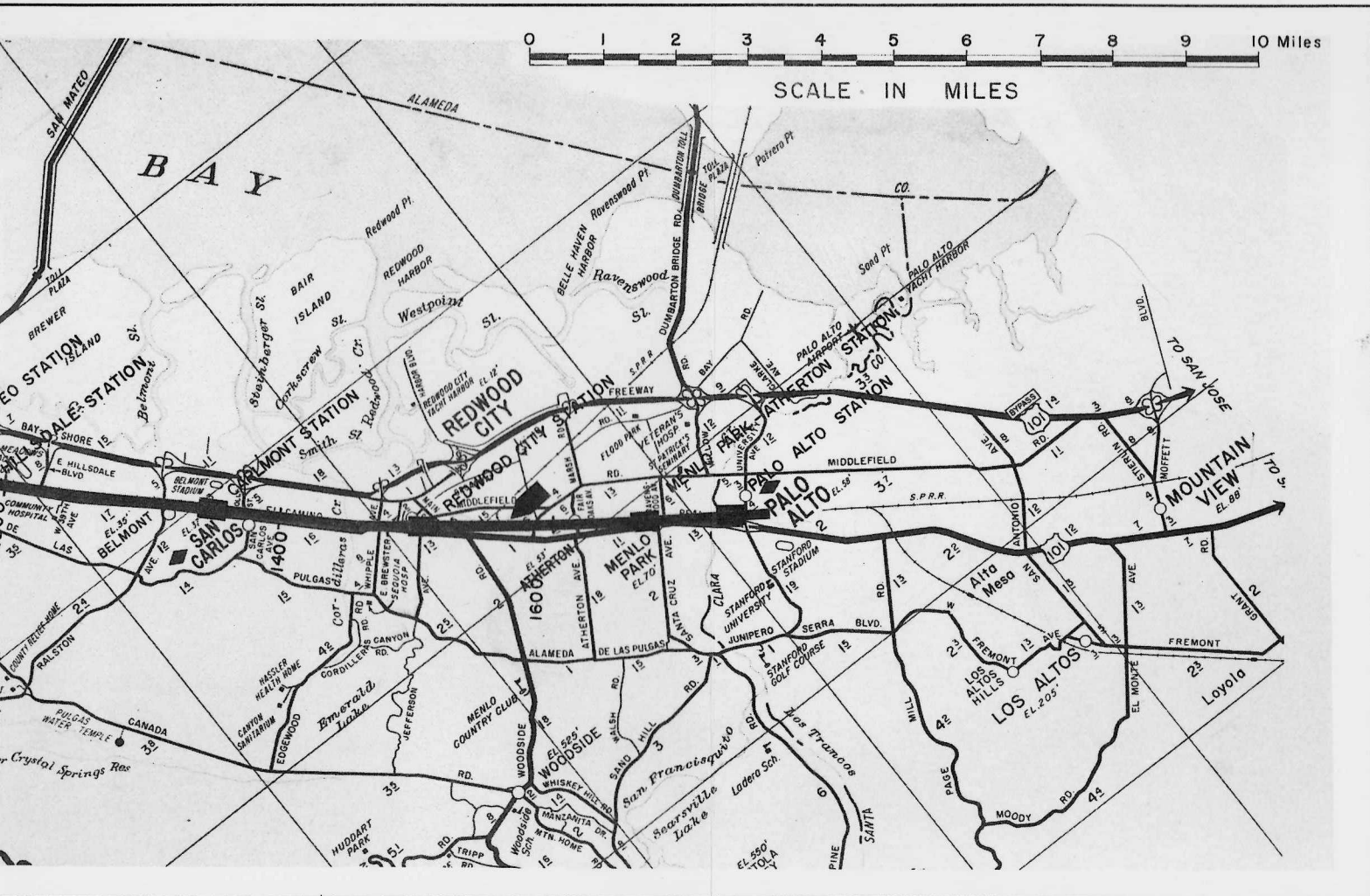
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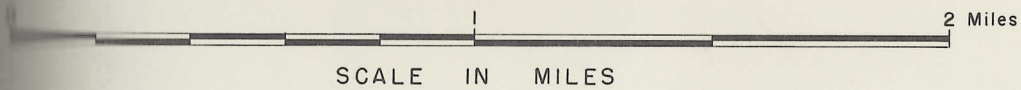
SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT
ROUTE LOCATION & STRUCTURE PLANS

PARSONS BRINCKERHOFF - TUDOR - BECHTEL • ENGINEERS
 NEW YORK SAN FRANCISCO

PENINSULA LINE
GENERAL ROUTE
 PLAN & PROFILE

SHEET NO.
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LEGEND

- LINE AND STATION
- RIGHT OF WAY EXTENSIONS
- YARD AND SHOP

NOTES:

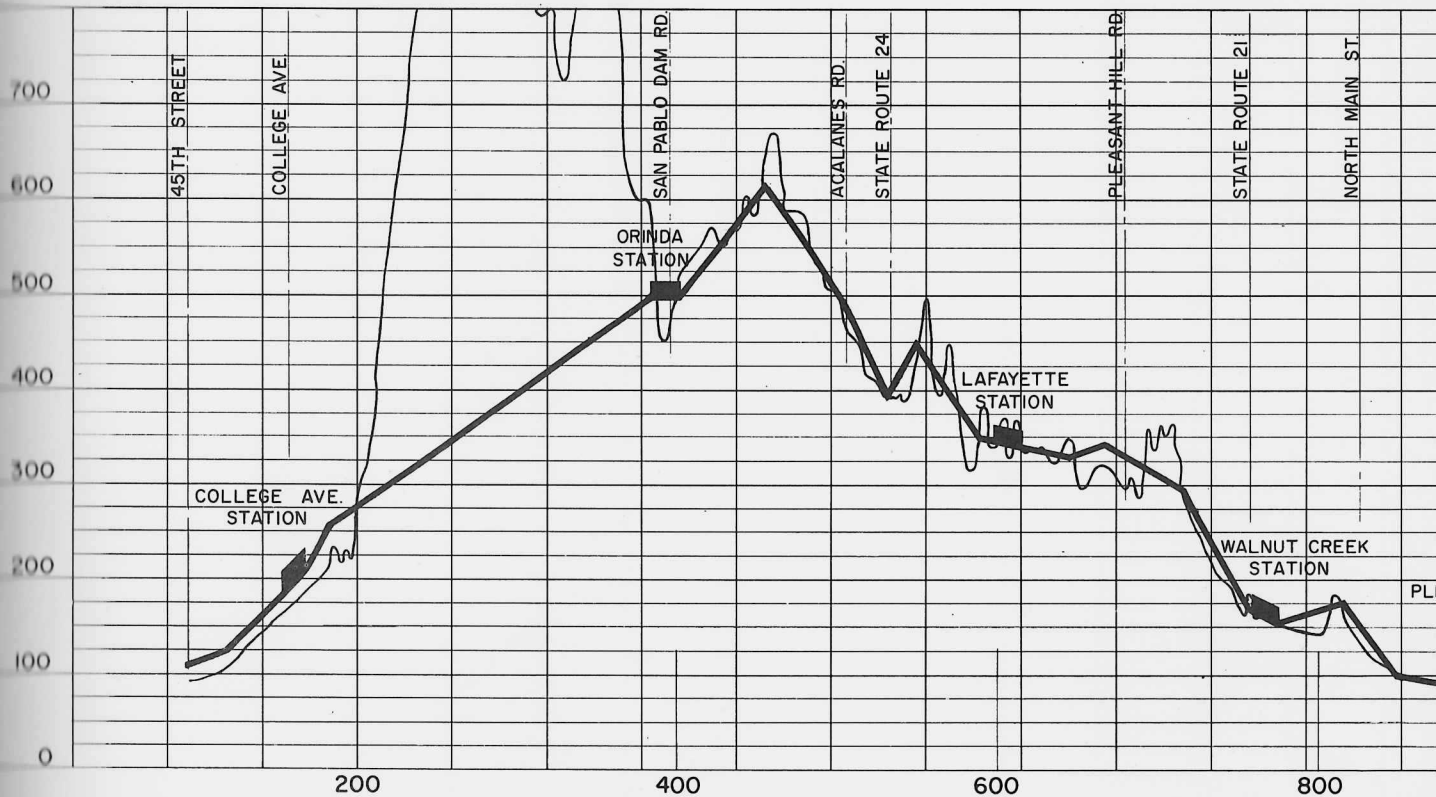
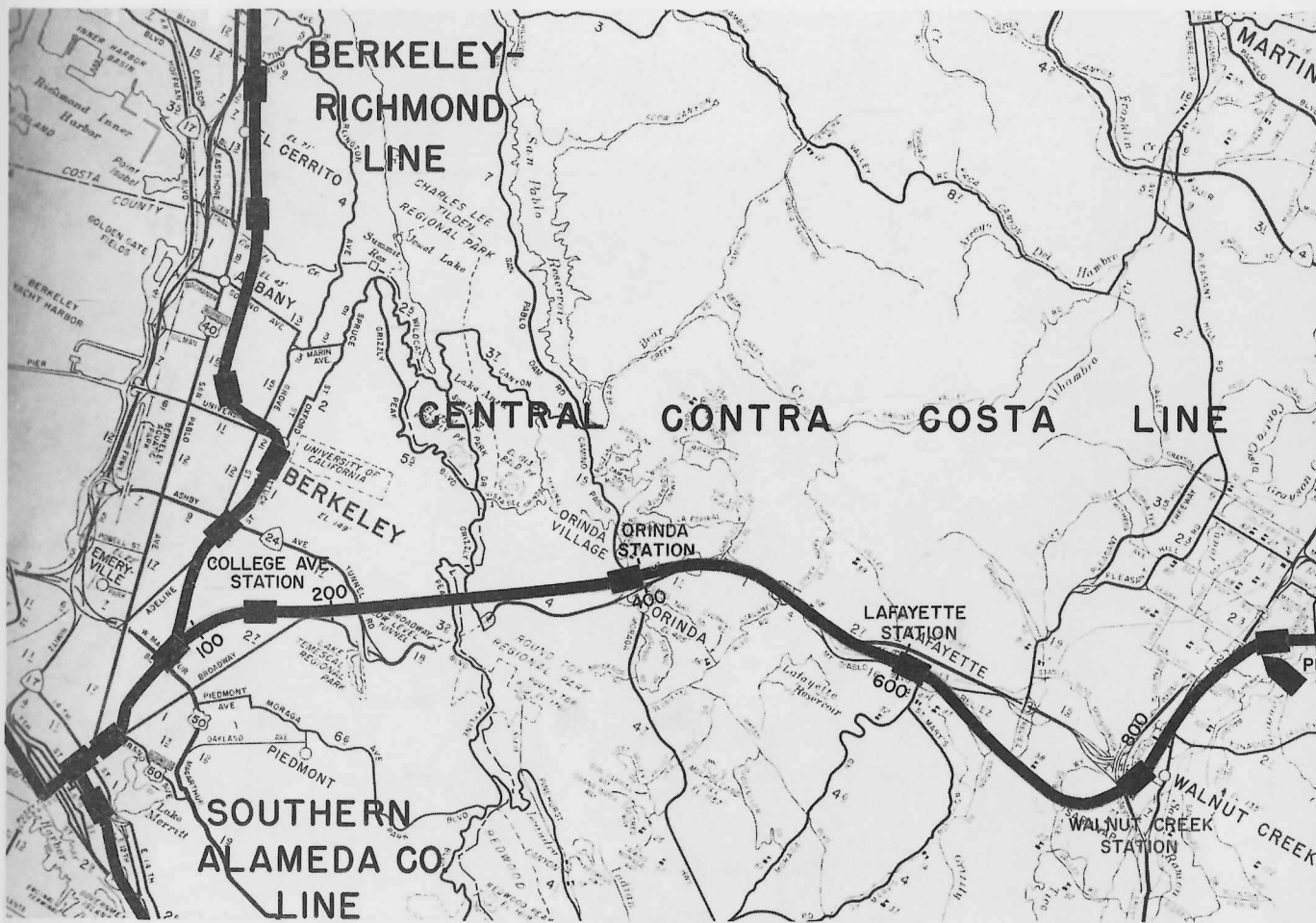


SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT
ROUTE LOCATION & STRUCTURE PLANS

PARSONS BRINCKERHOFF — TUDOR — BECHTEL • ENGINEERS
NEW YORK SAN FRANCISCO

OAKLAND AND VICINITY
GENERAL ROUTES
PLAN

SHEET NO.
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DATE: Feb. 9, 1961
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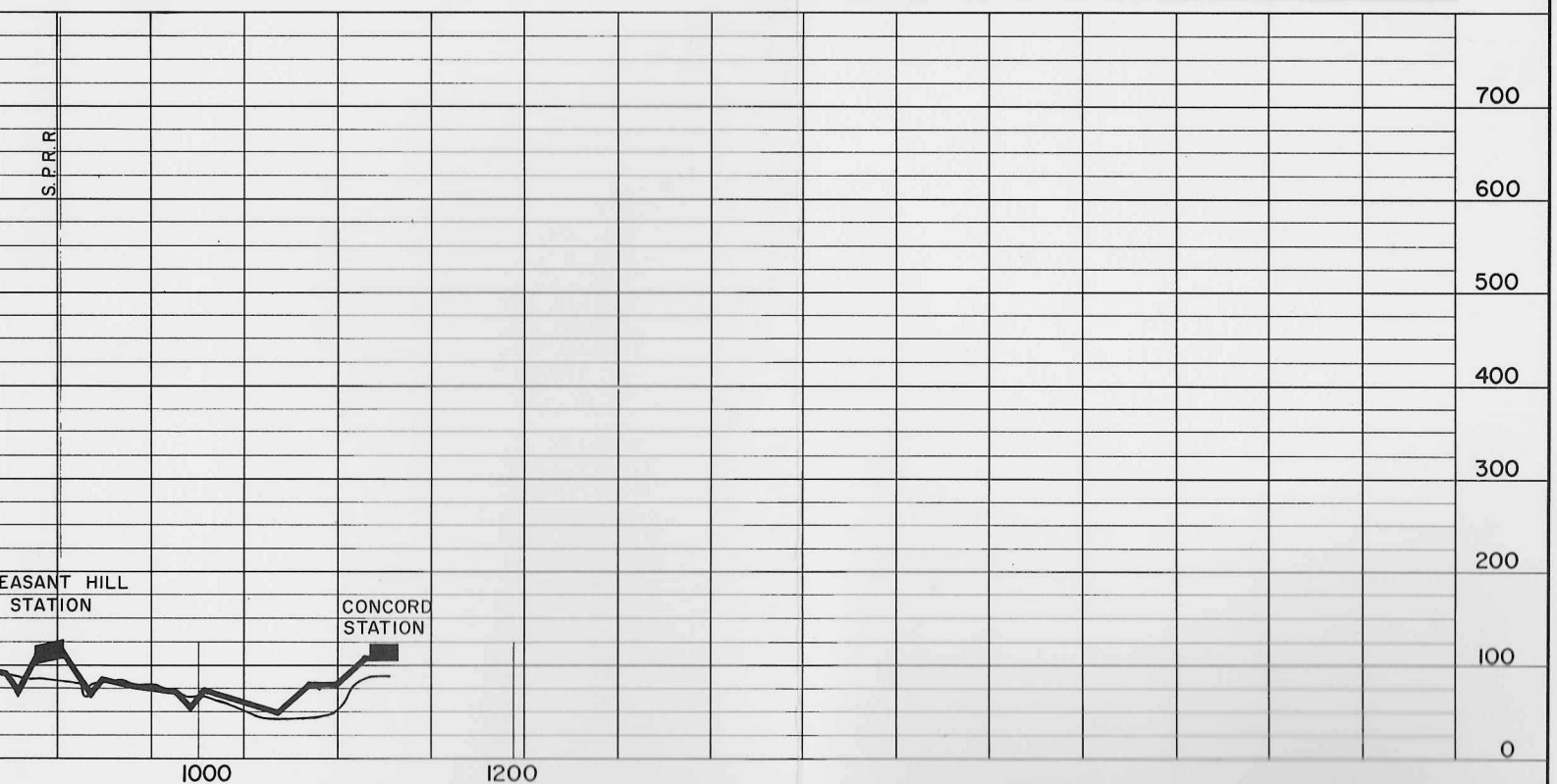
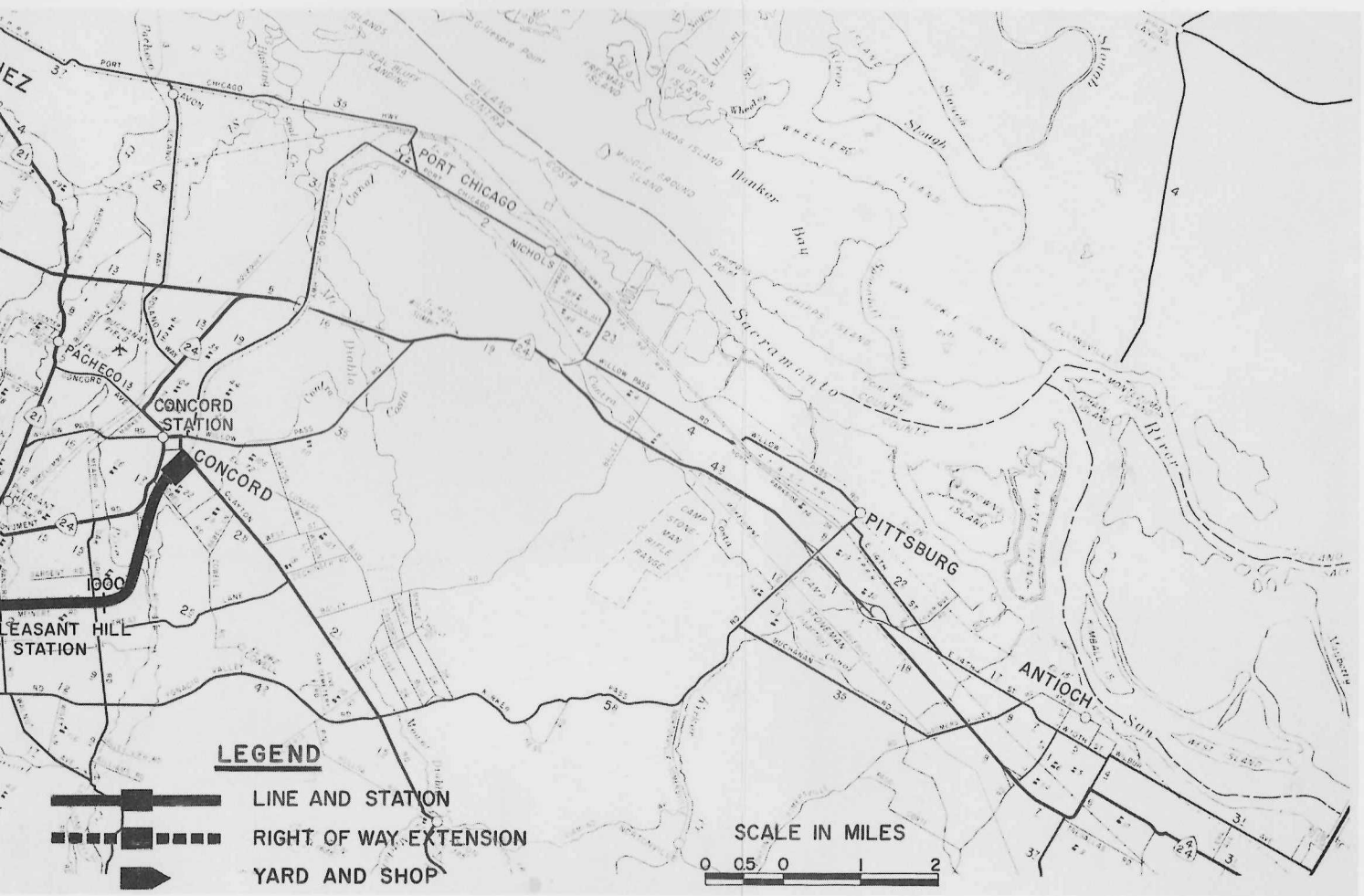


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SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT
ROUTE LOCATION & STRUCTURE PLANS

PARSONS BRINCKERHOFF — TUDOR — BECHTEL • ENGINEERS
NEW YORK SAN FRANCISCO

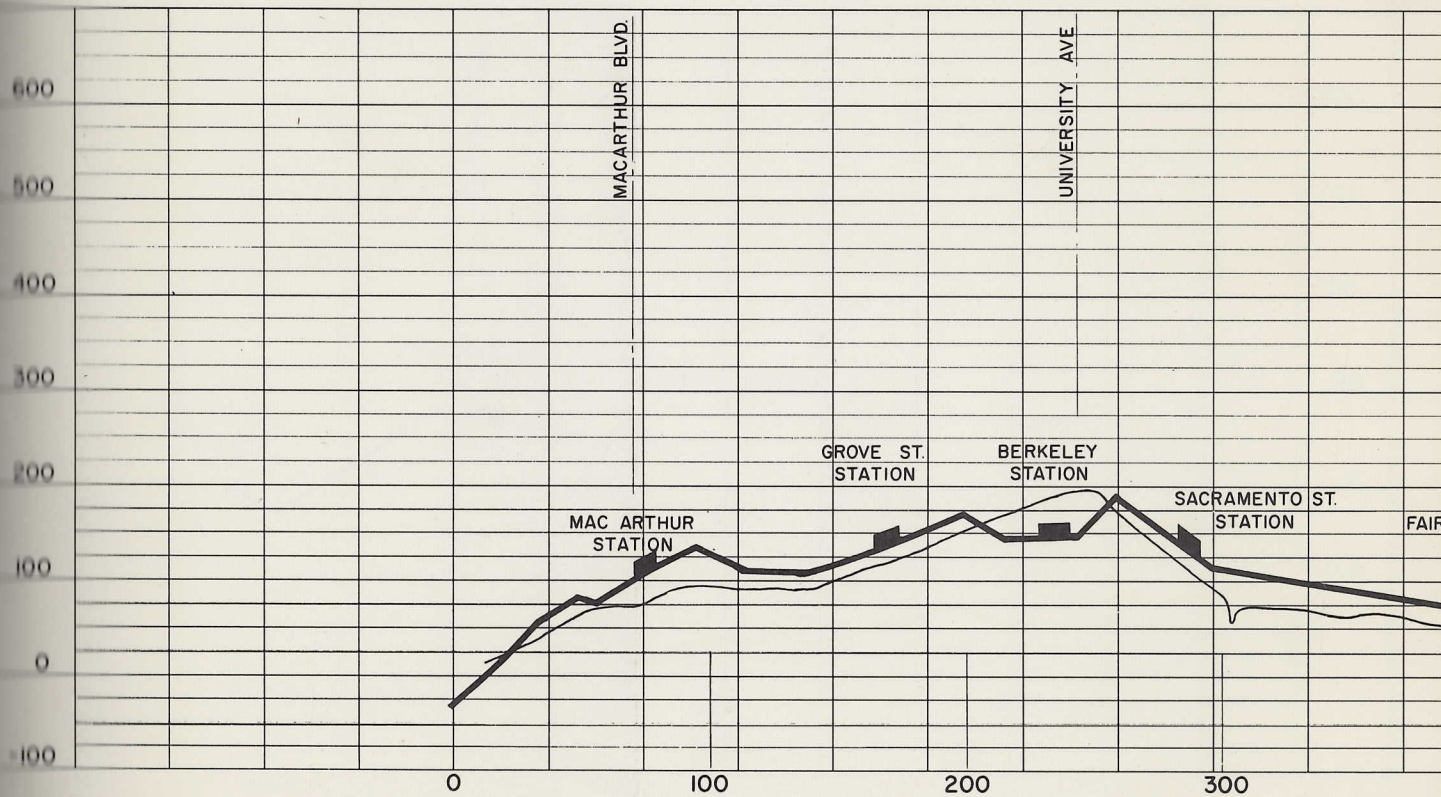
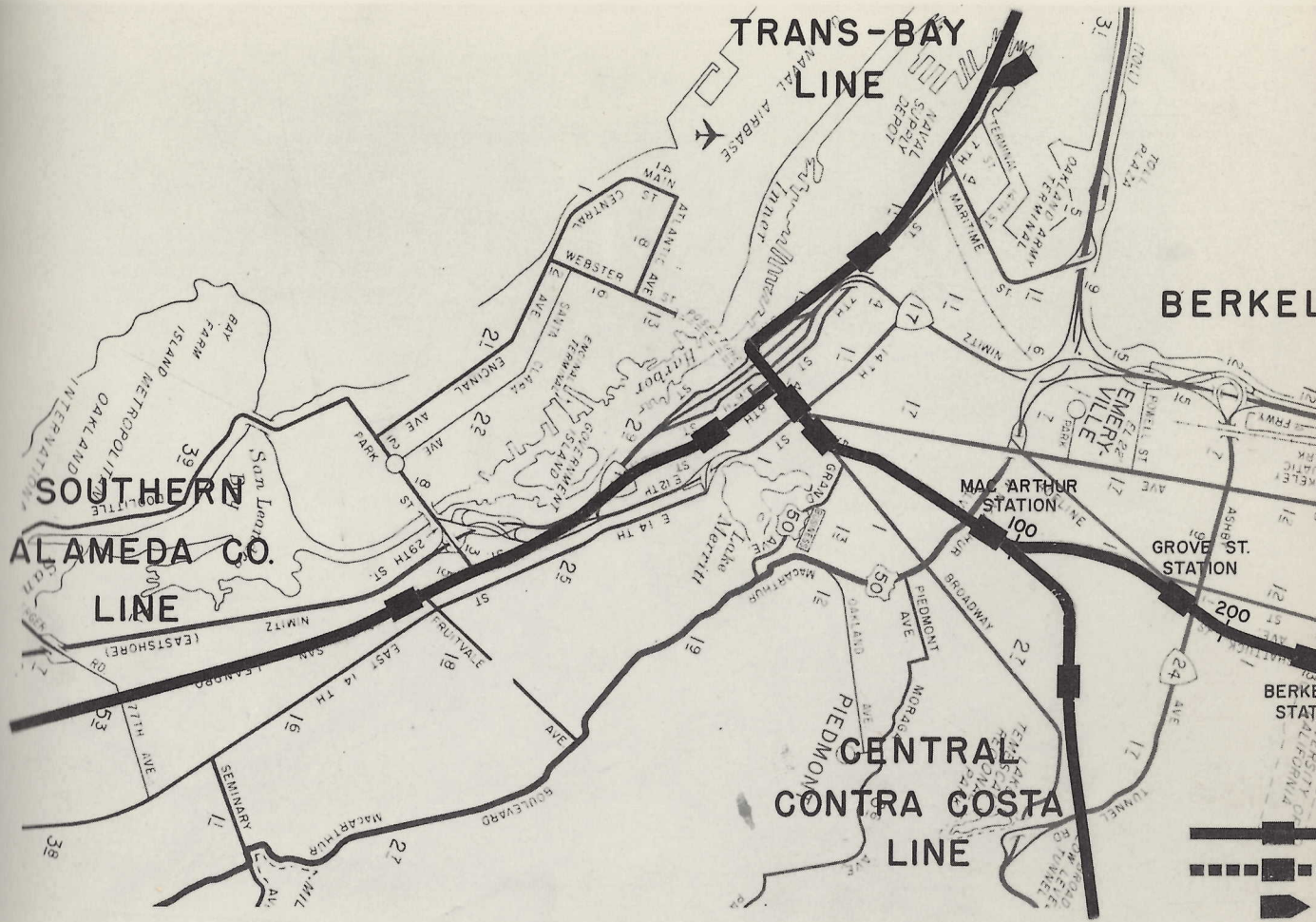
CENTRAL CONTRA COSTA LINE
GENERAL ROUTE
PLAN AND PROFILE
ALAMEDA AND CONTRA COSTA COS.

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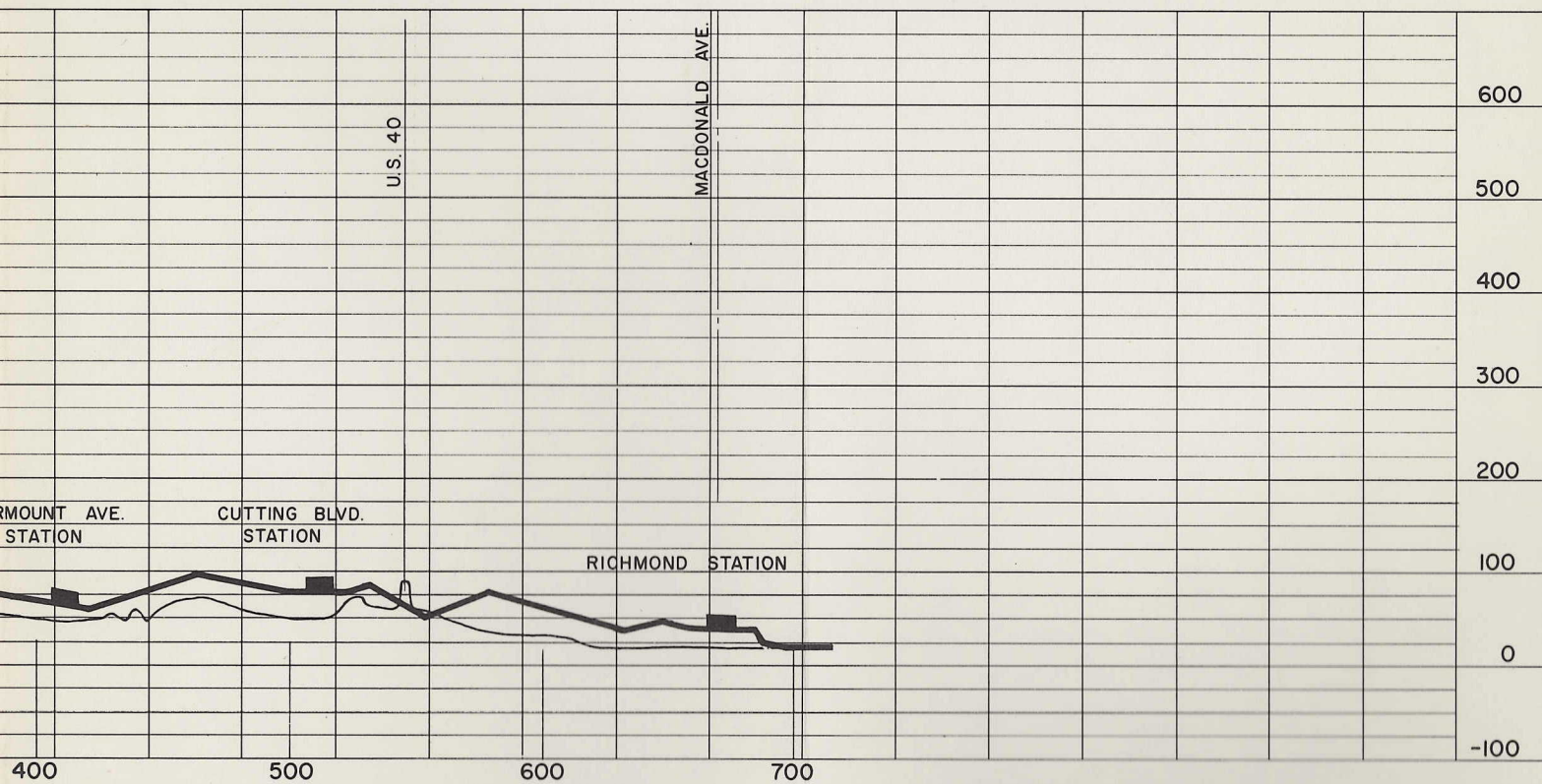
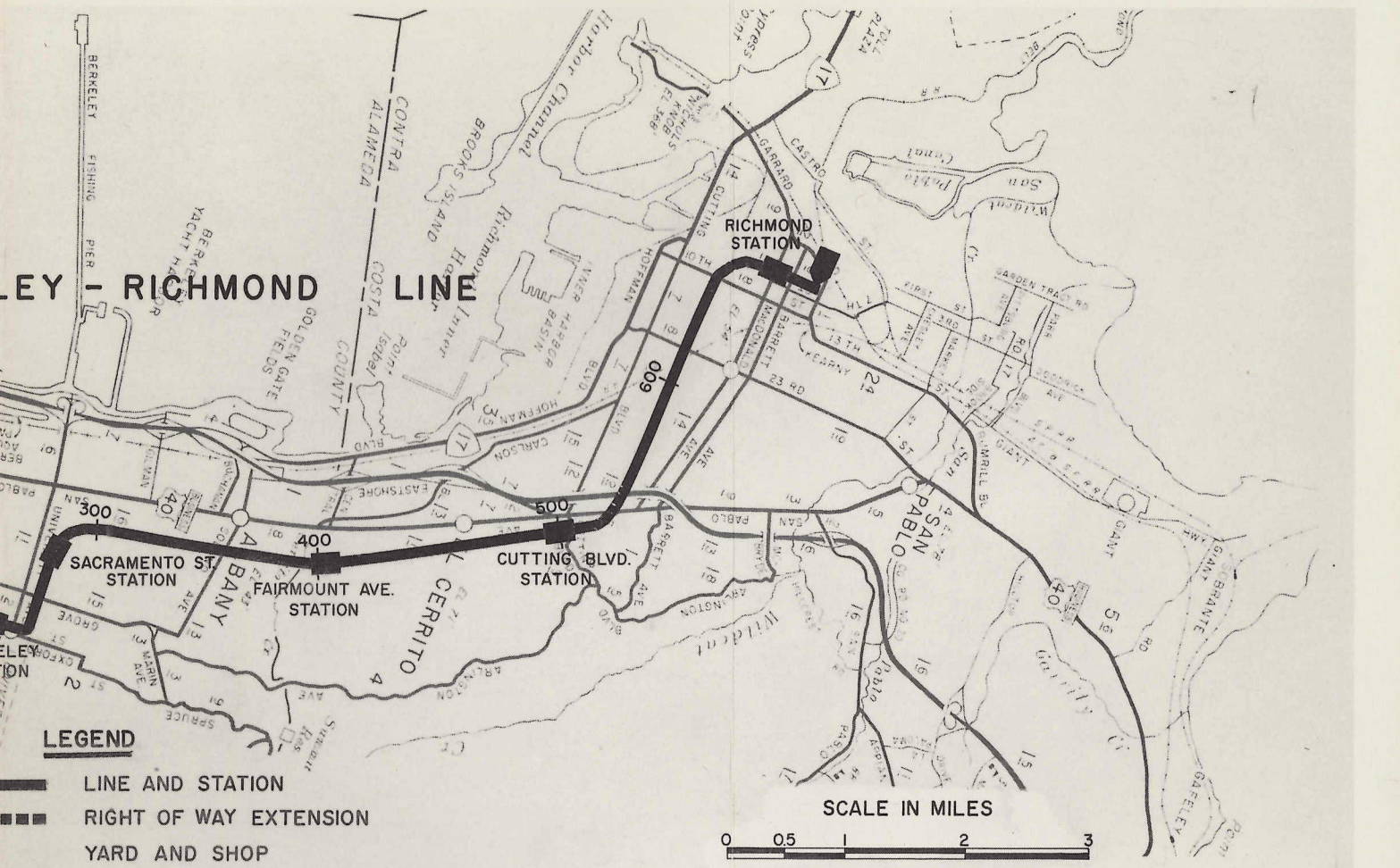


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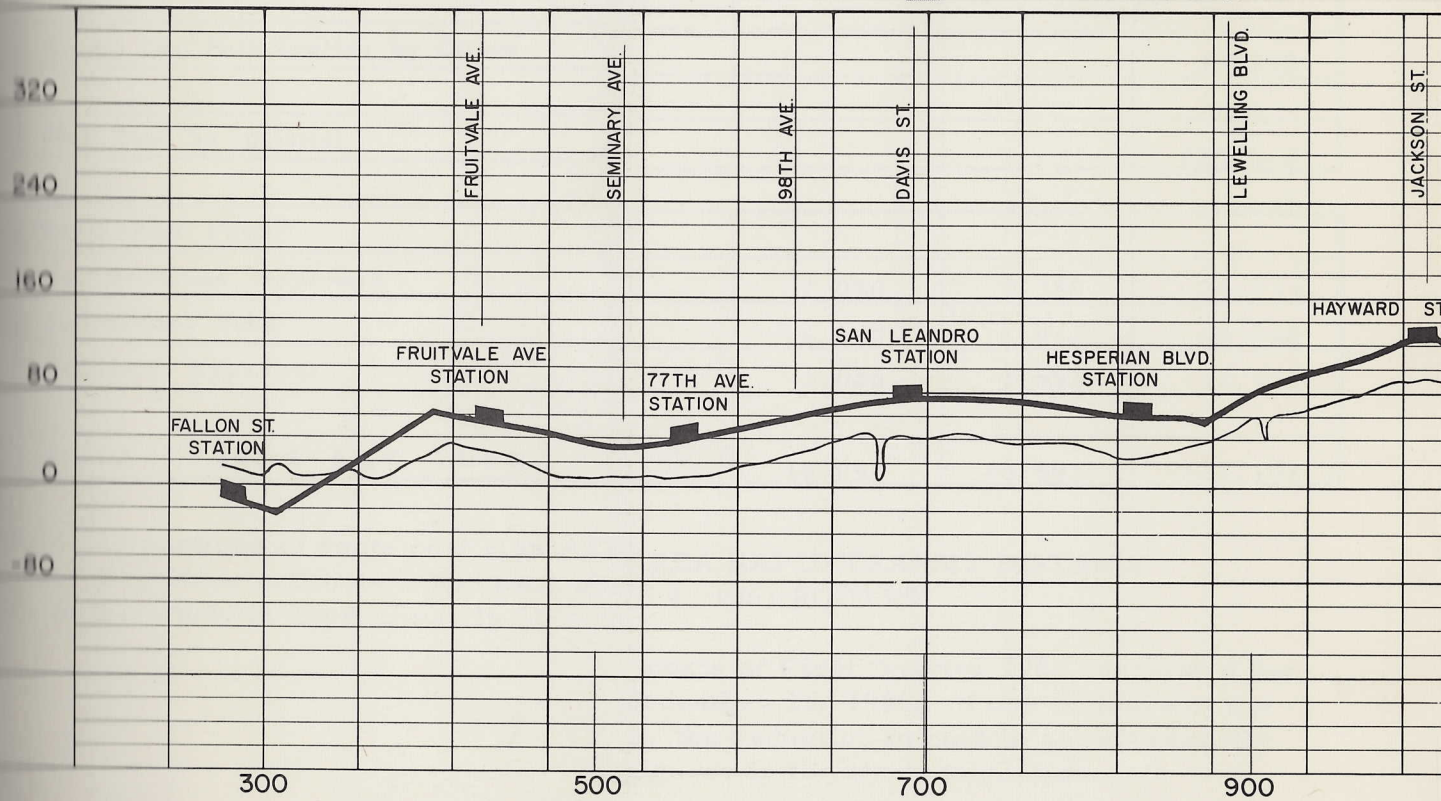
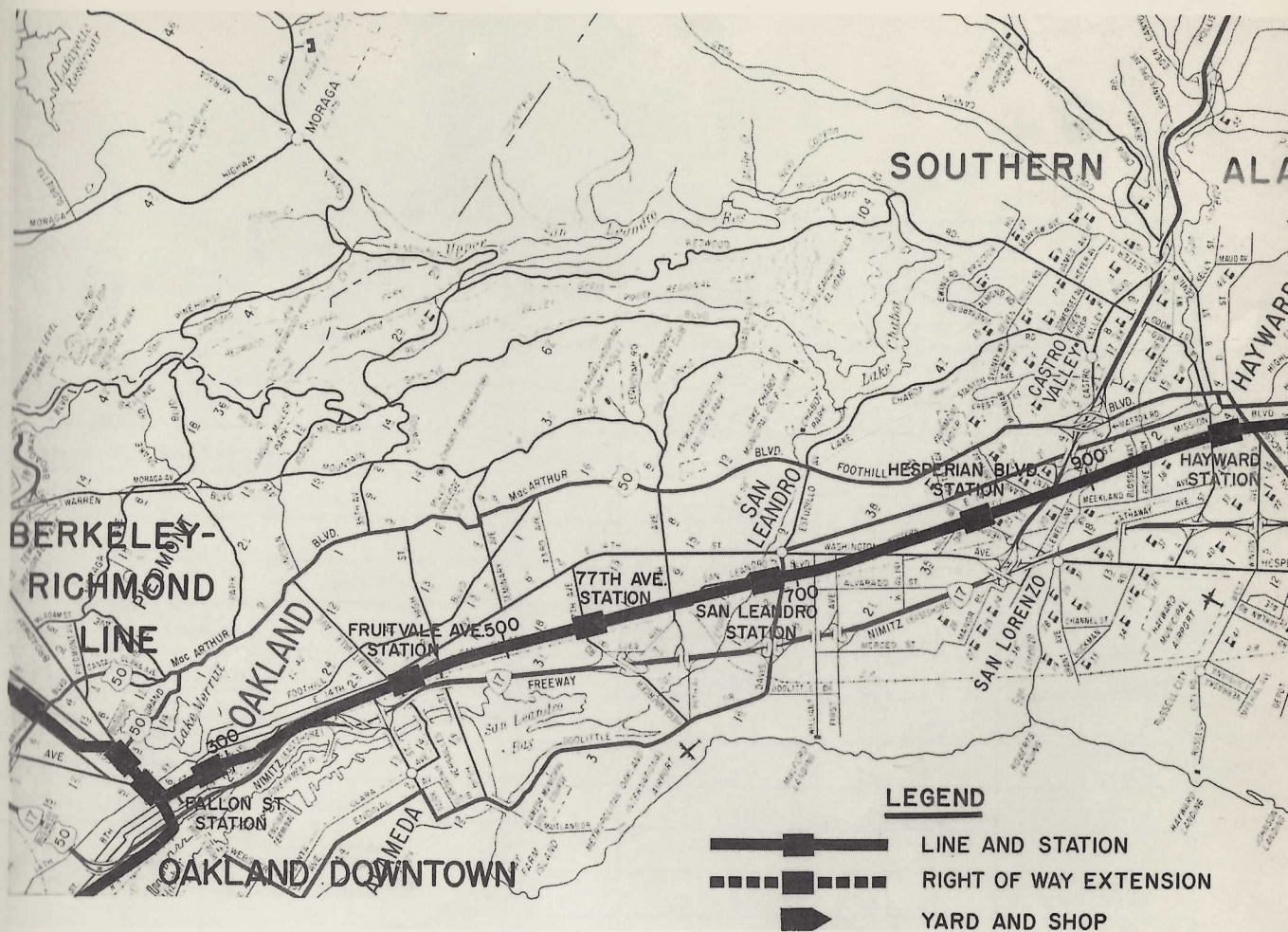


SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT
ROUTE LOCATION & STRUCTURE PLANS

PARSONS BRINCKERHOFF - TUDOR - BECHTEL • ENGINEERS
NEW YORK SAN FRANCISCO

BERKELEY-RICHMOND LINE
GENERAL ROUTE
PLAN AND PROFILE
ALAMEDA AND CONTRA COSTA COS.

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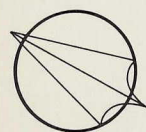
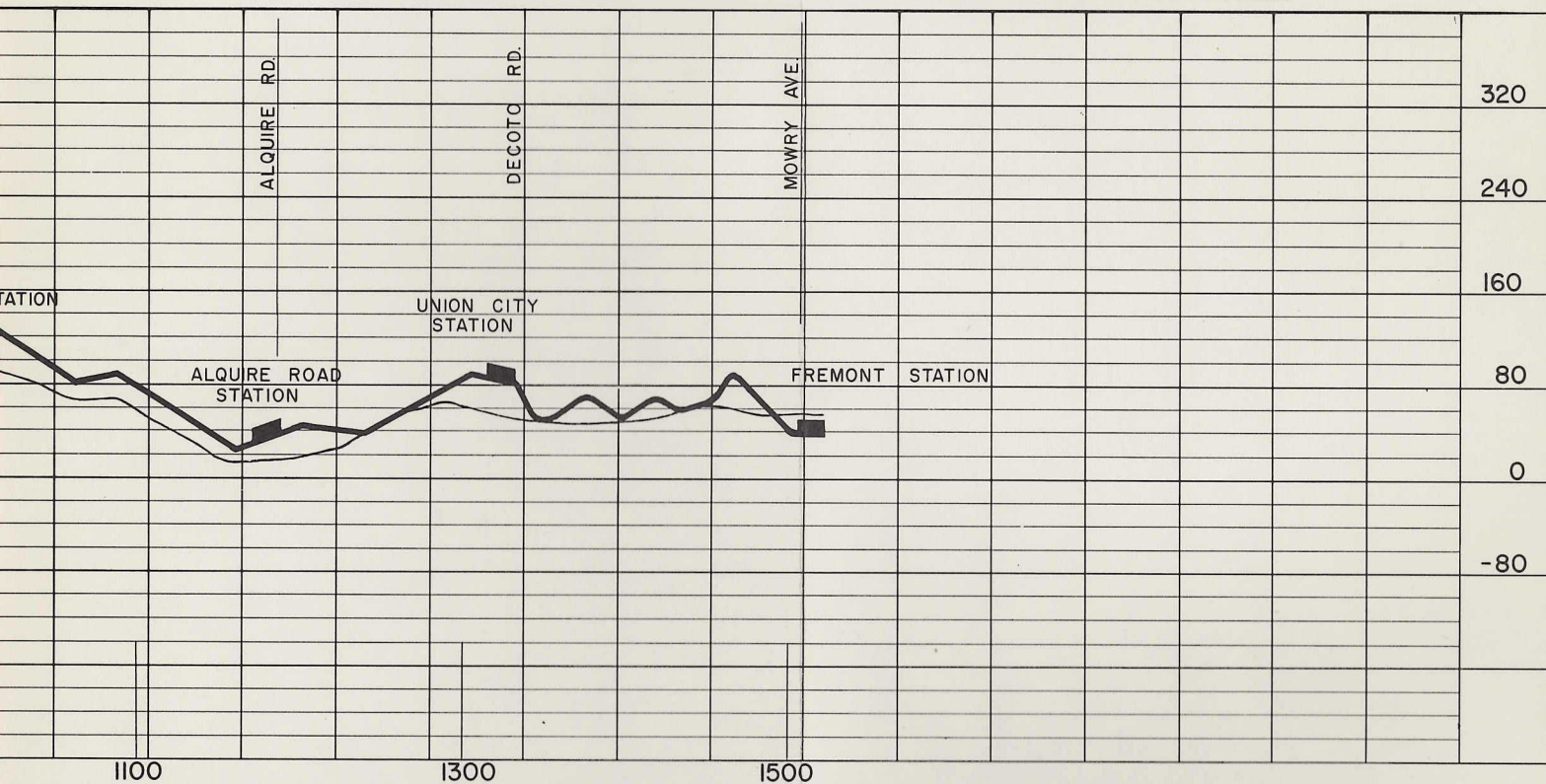
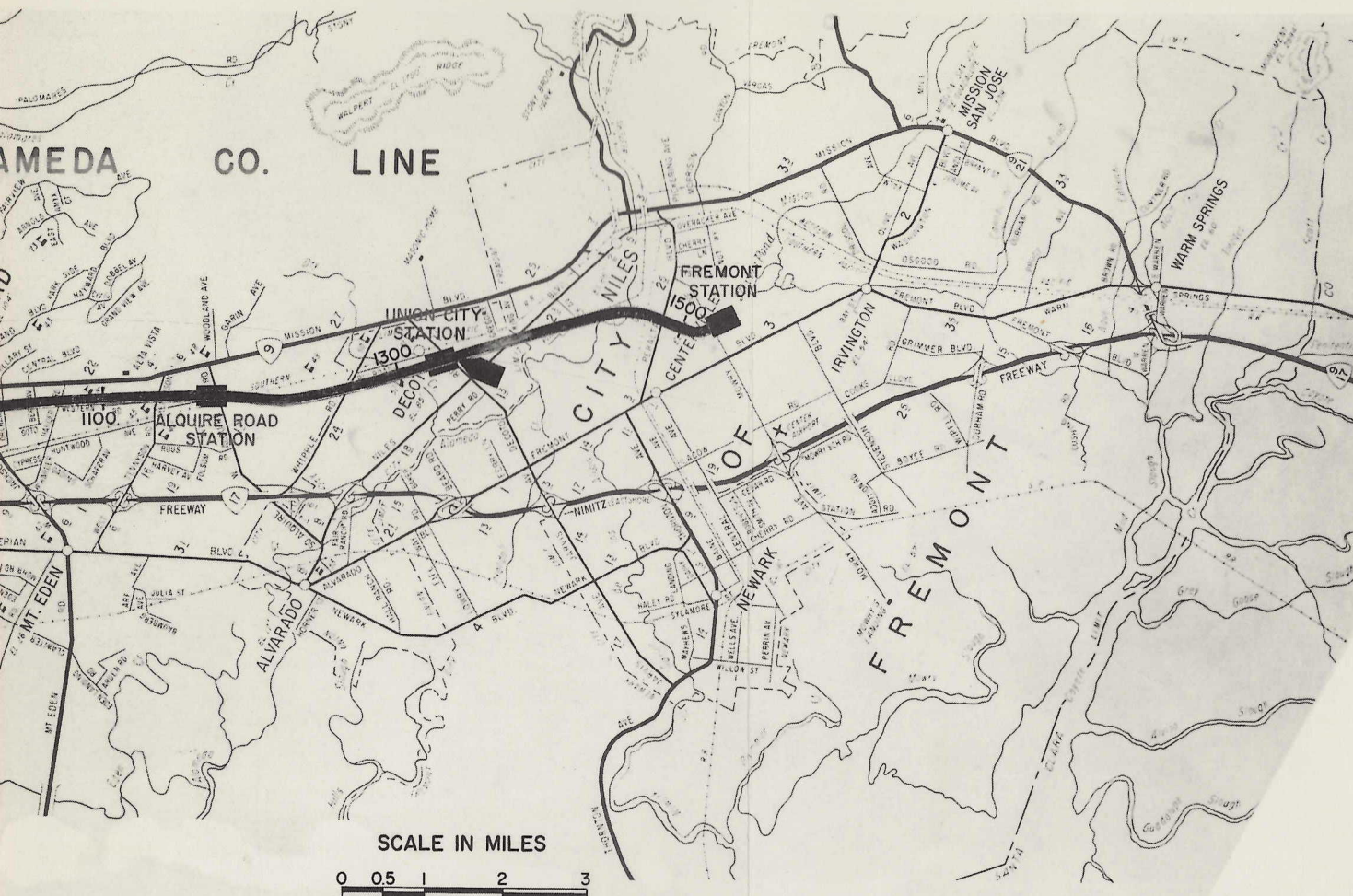


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SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT
ROUTE LOCATION & STRUCTURE PLANS

PARSONS BRINCKERHOFF - TUDOR - BECHTEL • ENGINEERS
NEW YORK SAN FRANCISCO

SOUTHERN ALAMEDA CO. LINE
GENERAL ROUTE
PLAN & PROFILE - ALAMEDA CO.

SHEET NO.

7

SCALE:

DATE: FEB. 9, 1961
FILE NO.

CONSTRUCTION COST ESTIMATE (All Figures In Millions of Dollars)

L I N E S	I T E M S	TRACK & STRUCTURES	STATIONS	YARDS & SHOPS	ELECTRI- FICATION	THIRD COST
WEST BAY ROUTES						
	Peninsula Line	71,563	16,487	4,901	22,789	5
	San Francisco Downtown	46,473	35,719	-	1,983	
	Marin Line	82,438	19,607	1,772	13,217	3
EAST BAY ROUTES						
	Oakland Downtown	26,729	15,677	-	1,633	
	Berkeley - Richmond Line	32,947	13,989	1,478	8,583	2
	Southern Alameda County Line	42,114	11,590	1,504	15,270	3
	Central Contra Costa Line	68,170	10,696	958	12,201	3
	Administration Bldg. & Central Shops	-	-	6,861	809	5
SUB TOTAL		370,434	123,765	17,474	76,485	24
Credit for Participation by Others						
Net Cost to District						

TRANS - BAY TUBE						
	San Francisco Approach	16,996	-	-	845	
	Subaqueous Tube	57,284	-	-	4,087	
	Oakland Approach	6,787	-	-	1,016	
TOTAL TRANS - BAY TUBE		81,067	-	-	5,948	

* Some portions of route cost marked by asterisk is based on an order of magnitude estimate. The total of the order of magnitude estimates in this study is approximately \$200,000,000.

ESTIMATE SUMMARY

Thousands)

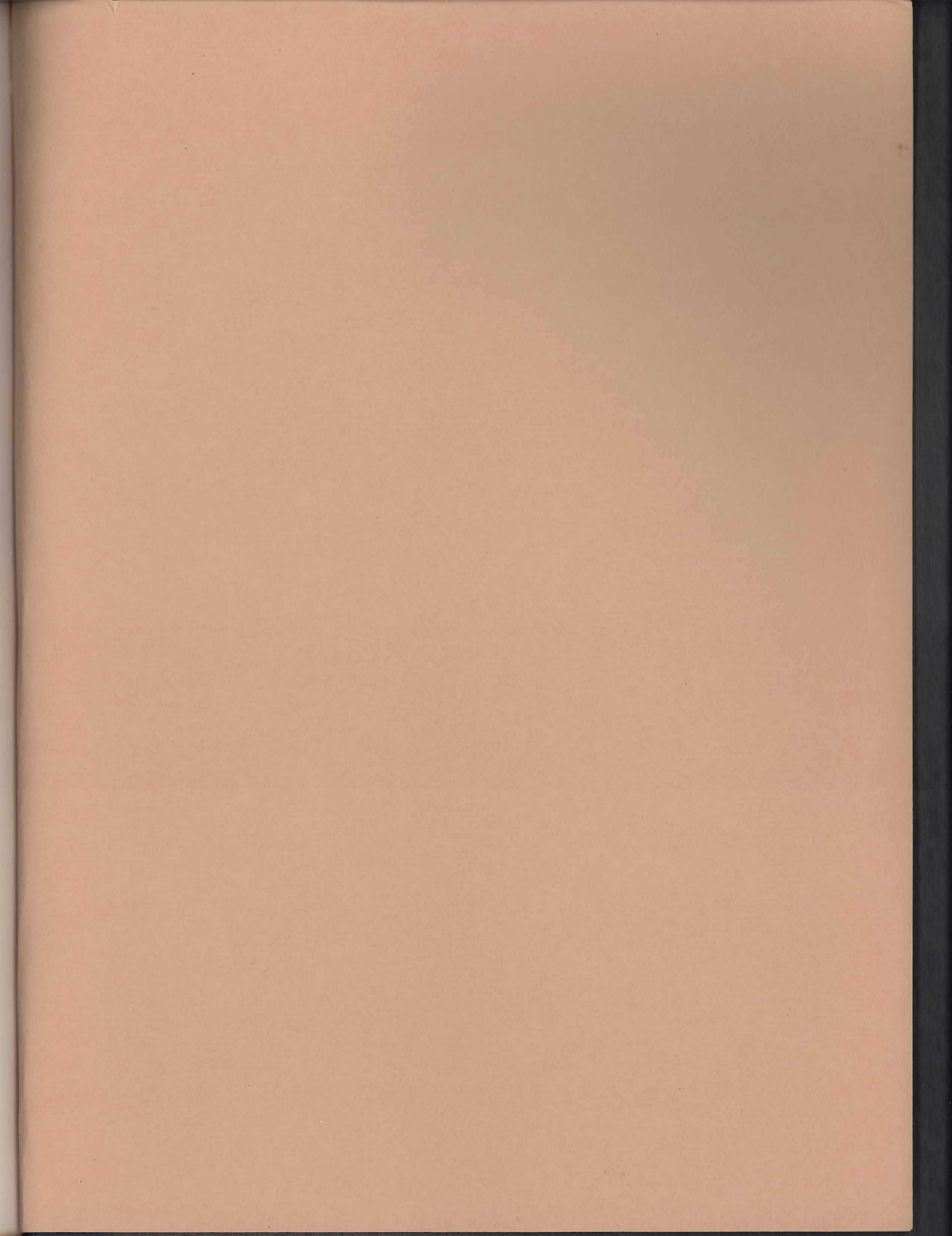
RAIN CONTROL	UTILITY RELOCATION	ENGINEERING & CHARGES	RIGHT-OF-WAY	RIGHT-OF-WAY EXTENSIONS	CONTIN- GENCIES	INFLATION	TOTAL	
268	14,134	13,513	28,018	-	17,667	29,151	223,491	*
496	12,427	9,710	2,994	-	10,980	18,117	138,899	
188	2,517	12,274	7,097	569	14,268	23,542	180,489	*
610	6,549	5,120	12,585	-	6,890	11,369	87,162	
286	2,727	6,201	27,365	-	9,558	15,770	120,904	
620	2,712	7,681	13,739	-	9,823	16,207	124,260	*
146	2,075	9,724	10,220	-	11,719	19,337	148,246	*
817	-	1,348	2,464	-	1,730	2,855	21,884	
431	43,141	65,571	104,482	569	82,635	136,348	1,045,335	
							19,720	
							1,025,615	

TRANS-BAY TUBE

76	720	1,863	-	-	2,050	3,383	25,933
564	1,470	6,341	47	-	6,979	11,516	88,288
259	370	843	977	-	1,026	1,692	12,970
899	2,560	9,047	1,024	-	10,055	16,591	127,191

SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT FEBRUARY 9, 1961 ROUTES

Estimate based on construction costs of First Quarter 1960, escalated for completion of construction by December 31, 1966. If one or more of the segments of a line is eliminated, the reduction in cost is not necessarily the amount represented by the figures in the above tabulation.



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